

ROYAL BOTANIC GARDENS, KEW.

---

---

BULLETIN

OF

MISCELLANEOUS INFORMATION.

---

---

No. 1]

[1915

I.—THE GENUS *Thesium* IN SOUTH AFRICA,  
WITH A KEY AND DESCRIPTIONS OF NEW  
SPECIES.

The genus *Thesium* appears to reach its highest development in South Africa, and is represented there by some 128 species, many of which show considerable external similarity. Owing to the unfortunate circumstance that Alphonse De Candolle and W. Sonder were working independently on the South African species of the genus and that they both published papers with descriptions of a large number of new species in the year 1857, which appeared within a few weeks of each other, considerable confusion has resulted. Sonder, in a supplementary paper,\* and De Candolle, in the *Prodromus*, attempted to harmonise the two monographs and to make the necessary reductions of species, but as the actual types were not always available to these two botanists, a certain amount of uncertainty has continued to exist. An examination of the type specimens collected by Ecklon and Zeyher, preserved at Stockholm, of the Thunberg specimens from Upsala and of type specimens from the Boissier Herbarium and from the herbaria of the British Museum, Berlin and Vienna, in comparison with the specimens at Kew, has permitted the elucidation of most of the outstanding difficulties.

In addition to the types the whole of the more modern collections in the herbaria at Berlin, Zurich, the Boissier Herbarium, the Bolus Herbarium and those of Mr. Galpin and Dr. Marloth have also been studied and have enabled a fairly comprehensive review of the genus to be undertaken for the *Flora Capensis*.†

Several small problems however remain unsolved, most of which demand a careful study of the plants in the field. Some of these are connected with the parasitism of the genus and suggest questions as to the possible effect of the host plant and other

\* Flora 1857, No. 26, pp. 401-407.

† To Mr. J. Hutchinson, Assistant for Africa, I am indebted for valuable assistance in the examination of material and the preparation of descriptions of the species.—A.W.H.

conditions on the appearance and general habit of the parasite. Then certain biological features require examination, such as the possible heterostyly of some species, as for instance, *T. carinatum* and *T. capitatum*, where such a possibility is outlined. Then again, the question of purity of the species and the possibility of extensive hybridisation is suggested by a study of the genus with its groups of closely related species and by some of the widely varying species in which the extreme types are connected by a complete series of intermediate forms. Finally, the morphology of the flower would repay a careful study in the field with a view to the elucidation of the meaning of the attachment of the anthers to the perianth segments in the majority of the species\*; the ring of throat hairs in the section *Annulata* where the anthers are free; the value of the apical beard and the importance and true character of the external glands, which in some species are so conspicuous a feature of the perianth.

De Candolle† grouped the species of South African *Thesium* under the following five sections:—

- i. **Euthesium** (Perigonium infundibuliforme vel campanulatum lobis non barbatis).
  - §1. Stylus elongatus, stigma capitatum.—Species her-  
baceae perennes.  
*T. juncifolium*, *T. Krebsii*, *T. angulosum*.
  - §2. Stylus abbreviatus, truncatus.—Sp. suffrutescentes.  
*T. pallidum*, *T. pinifolium*, *T. erectiramosum*, *T. par-  
vifolium*, *T. brevifolium*, *T. selagineum*, *T. cricae-  
folium*, *T. acutissimum*, *T. multiflorum*.
- ii. **Ætheothesium** (Pars libera perigonii sub-5-partita.—Fru-  
ticulus habitu Penaeaceae).  
*T. euphorbioides*.
- iii. **Hagnothesium** (Flores dioici, etc., etc.).  
= *Thesidium*.
- iv. **Discothesium** (Perigonium Euthesii, Discus concavus,  
margine liber.—Rami saepe scandentes).  
*T. galioides*, *T. planifolium*.
- v. **Frisea**, Brown (Lobi perigonii intus ab apice et marginibus  
barba pendente insignes).
  - §1. Pili loborum pone antheras nulli.—Flores spicati.  
*T. amblystachyum*, *T. micropogon*, *T. flexuosum*, *T.  
macrostachyum*.
  - §2. Pili in medio loborum.—Flores spicati vel capitati.  
*T. gnidiaceum*, *T. carinatum*, *T. pubescens*, *T. capitel-  
latum*, *T. densiflorum*, *T. euphrasioides*, *T. micro-  
meria*, *T. Zeyheri*, *T. lobelioides*.

\* Ewart in his paper "On the staminal hairs of *Thesium*" in *Ann. Bot.* vi. (1892) pp. 271-290 gives a careful description of the structure of the two types of perianth hairs, but their exact function is still obscure. De Candolle had previously given some account of the perianth hairs in his "Note sur la famille des Santalacées" in *Soc. Phys. et Hist. Nat. Genève*, August, 1857, pp. 11, 12.

† "Espèces Nouvelles du Genre *Thesium*" présentées à la Société de Physique et d'Histoire Naturelle de Genève dans sa séance du 28 Mai, 1857, par M. Alph. de Candolle.



Sonder\* enumerates 56 species, many of which are of his own creation, and the majority stand to-day. These he grouped chiefly according to vegetative characters without reference to the perianth, and the first 41 species are set out without reference to the presence or absence of the perianth beard. They are grouped under headings such as '*spinosa*,' '*axillaria*,' '*racemosa*,' '*spicata*,' and so on. Under his twelfth heading (m) '*paniculata micrantha*,' however, he brings in the qualifying character '*a perigonio nudo*,' and places under it *T. paniculatum* (= *T. virgatum*, Lam.), *T. nigromontanum*, Sond., *T. squarrosus*, L., *T. corymbuligerum*, Sond., *T. ramellosus*, Sond., *T. leptocaulis*, Sond., *T. commutatum*, Sond., and '*β perigonio barbato*,' with *T. capituliflorum*, Sond., *T. hispidulum*, Lam., *T. confine*, Sond., *T. hottentottum*, Sond., *T. tenue*, Bernh. (= *T. paniculatum*, L.), *T. debile*, Spreng., and *T. rariflorum*, Sond.

In the Prodrômus† De Candolle retains his sections as set out in the earlier paper, though he modifies considerably his arrangement of the section *Frisea*, which is broken up into two subsections depending on the presence or absence of a ring of hairs in the throat of the perianth coupled with the presence or absence of a tuft of hairs attaching the anthers to the perianth-segments. In the second section, including the species without the hairs behind the anthers and with the throat ring of hairs, he places 15 species, seven of which, however, do not rightly belong, since they have no throat ring and the anthers are attached. These seven are *T. junceum*, Bernh., *T. flexuosum*, A.DC., *T. phyllostachyum*, Sond., *T. Ecklonianum*, Sond., *T. griseum*, Sond., *T. magalismontanum*, Sond., and *T. rariflorum*, Sond., which belong properly to his first subsection of the section *Frisea*.

Since the publication of the Prodrômus there has been no systematic attempt to revise the Thesiums of the Cape region, although a certain number of new species have been described from time to time. A great deal of material has accumulated, largely owing to the activities of Galpin and Schlechter, which has necessitated the description of 52 new species. Several species described by Sonder, which were reduced by De Candolle, have also been restored.

As was observed by De Candolle, a number of well-marked floral types are to be found in the genus. In the majority of species the characteristic features of the attached anthers obtains. In these cases there is a tuft of hairs behind the anther arising from the face of the perianth-segments or from the tube and more or less adhering to form a rod-like structure which is attached to the apex of the anther and serves to keep that organ in place against the perianth-segments or wall of the tube. The two newly-constituted sections *Imberbia* and *Barbata* include all the species with attached anthers and correspond in part with De Candolle's sections i, ii, iii, and v §1 and 2. A third section corresponding in part to De Candolle's subsection i of his section *Frisea* (to which the name *Annulata* is assigned) is

\* Enumeratio Santalacearum in Africa australi extratropica crecentium quas Dr. Ecklon et C. Zeyher collegerunt, W. Sonder in Flora Nc. 23, 21 June, 1857, pp. 353-364.

† Prodrômus xiv. p. 661.

characterised by the absence of the attaching anther hairs and the presence of a ring of downwardly-directed throat hairs arising from the perianth at the level of the attachment of the anther filaments (see figs. 14, 15, 16). These perianth hairs, forming a ring, are the equivalent of the attachment hairs seen in other species.\* A fourth section may be recognised in which there is a group or pencil of hairs behind each anther which is free and not attached to the anther in any way. This condition has only been noticed in one species, *T. penicillatum* (see fig. 13), which forms the type of the newly-constituted section *Penicillata*.

Another means of sub-dividing the species into sections is offered by the character of the perianth-segments, and a natural sub-division can be made of those species which have a conspicuous apical beard from those in which the beard is not present. The former or bearded group, *Barbata*, corresponds in part to De Candolle's section *Frisea*.

The latter group, which has been named *Imberbia*, shows three or four differing types of flower which are probably not of first-rate importance as distinguishing characters for purposes of classification:—(1) The perianth-segments may be simply hooded with the margins perfectly glabrous, as in *T. triflorum* or *T. nigromontanum* (figs. 2 and 3); (2) the perianth-segments may be fringed with minute papillae (*T. strictum*, fig. 6); (3) the perianth-segments may have a marginal fringe of long papillae forming a kind of serrulate edge (*T. Hystrix*, fig. 7); or (4) the margins may be extended to form two lateral flaps or lacinulae as is seen in *T. lacunculatum* (fig. 5). The three first-mentioned floral types are included in the subsection *Subglabra* and the last in the subsection *Fimbriata* of the section *Imberbia*. Between the plants with glabrous perianth-segments and those with papillose margins there appears to be no well-marked dividing line. In *T. strictum* the papillae can be clearly seen, but in a few species though present are scarcely noticeable. The longer serrulate fringe of *T. Hystrix*, *T. hystricoides* and *T. horridum*, and the lacinulae of *T. lacunculatum* and *T. pleuroloma*, however, are definite characters and serve to place these five species in the separate subsection *Fimbriata*.

The disc is another floral feature which is not always clearly marked. It is well seen in *T. triflorum* (fig. 2, and in *T. strictum*, fig. 6) and in allied species with glabrous *Euonymus*-like flowers. A disc or disc-like body also appears to occur in some of the bearded species where there is often an orange, somewhat fleshy base to the perianth.

De Candolle† established a section *Discothesium* on this character and the disc is well marked in *T. triflorum*, *T. scandens*, *T. galioides* and *T. corniculatum* (= *T. acutissimum*), which he placed in the section. Other species, such as *T. lineatum*, *T. strictum*, etc., where the disc is conspicuous, might equally well have been included, and the character does not appear to be sufficiently well-marked to warrant the formation of a section on this character alone.

\* See Ewart in Ann. Bot. vi. 1892, pp. 271-290.

† De Candolle, Esp. Nouv. Thesium, p. 5.



The external glands afford another feature of doubtful significance. They are present and plainly visible either as small circular or oblong bodies alternating with the perianth-segments in many species (e.g., *T. nigromontanum*, *T. lacinulatum*, *T. coriaceum*, etc.—see figs. 3, 5, 8, 9), but in others again they cannot be recognised, and it is often a matter of doubt whether they are entirely absent or only very slightly developed. They may be found in species belonging both to the bearded and unbearded sections of the genus. A detailed investigation\* of their morphology is not possible in dried material; it is therefore to be hoped that a botanist in South Africa may be stimulated to make an examination into the morphology and physiology of these obscure organs as well as of other points connected with the biology of the flowers of *Thesium*.

In the bearded section, *Barbata*, after the primary subdivision on the question of the presence or absence of hairs behind the anthers, the chief point of distinction in the flowers lies in the character of the apical beard and the texture of the perianth-segments. More commonly the beard consists of a dense mass of woolly, waved hairs, but sometimes the beard is composed of relatively few, stiff, straight, comb-like hairs. In some of the species with this type of beard the perianth-segments are horny and translucent and the margins of the segments are fringed with a frill of short fine hairs, as for instance in *T. spicatum* (fig. 15).

The stiff and the woolly types of beard have been found to afford a good character for separating certain species such as *T. junceum*, *T. flexuosum*, *T. natalense*, etc., which exhibit considerable external resemblance.

The position of the anthers, either included in the tube or exserted and carried up against the perianth-segments is an important character in the section *Barbata* and is often found to be associated with the length of the style. When the stigma is sessile the anthers are often inserted deep down in the tube, as in *T. carinatum* (fig. 10).

The possibility that heterostylism may occur in the genus is suggested by the floral arrangements of the two closely similar species, *T. carinatum* and *T. capitatum* (cf. figs. 10 and 11), but the relative lengths of anthers and style in the two species, though highly suggestive of this state, are not quite convincing. So similar in general appearance are these two species, however, that it is frequently impossible to assign a specimen to the proper species without dissecting the flower.

Throughout the genus it is unusual for the style to be of such a length that the surface of the stigma is above the level of the anthers. Sometimes it is at about the level of the middle of the

---

\* The gland-like structures have been examined, as far as is possible with herbarium material, by Mr. L. A. Boodle. These portions of the perianth are rather thicker than the adjoining parts, and may have dense or brown contents in their internal tissues. They are all the more striking in comparison with the large, nearly empty cells lying adjacent which are connected with the staminal hairs. The epidermis bounding the structures externally has a considerably thinner wall than the epidermis of the intervening parts, and this feature may indicate that an excretion is exuded from them on the outer side of the perianth tube.

anthers, but more commonly the style is short and stout and does not attain to the anther level; very often the stigma may be sessile.

The vegetative organs display a wide range of variation, and the genus includes herbs, subshrubs and shrubs, erect, prostrate or scandent, which may be densely leafy or almost leafless, more or less succulent or sharply spinous.

The leaves, when well developed, are usually linear, linear-lanceolate or acicular, more or less keeled, and are generally larger towards the base of the plant; the floral bracts are similar to the leaves. *T. euphorbioides*, with its large amplexicaul leaves, is quite a unique species. In many species the leaves are merely subulate scales and both they and the bracts may have fimbriated or scurfy edges or blackish, acuminate tips.

In the spinous species the leaves may be closely folded with sharp edges and form spines (*T. spinosum*, *T. spinulosum*), or they may be solid terete spines as in *T. pungens*. The branches also end in spinous tips.

The stems are usually grooved, the ridges in many species, as for instance in *T. lineatum*, being pronounced, and in *T. angulosum* they are extended to form definite wings. The species with spinous stems (*T. rigidum*, *T. Hystrix*, etc.) are peculiar in having an irregular wrinkled surface, and the cortical tissue in these species as in the others with few leaves is of chief importance in assimilation.

Pubescence is not common, but it may be found both among the spinous and leafy species.

In some species there is a good deal of variation, and it is not always easy to assign a specimen very definitely to a particular species. This occurs especially with specimens of *T. virgatum*, *T. strictum* and allied species, also in *T. funale* and its allies. In such cases, where species occupy the same geographical areas, it seems probable that hybridisation may account for the observed resemblances.

Owing to the general precision of the work of Sonder and De Candolle it has not been found necessary to reduce many of their species, but in one instance considerable confusion has arisen. The type of Linnaeus' species *T. paniculatum*, preserved in the Linnean Herbarium, and described in the Mantissa, p. 54, does not appear to have been seen by any other writers on the genus. Sonder quotes a specimen preserved at Stockholm as Linnaeus' type, but this is an entirely different plant agreeing with *T. virgatum*, Lamarck. Thunberg has two sheets labelled *T. strictum*  $\delta$  and  $\gamma$  in his herbarium which bear specimens ( $\delta$  spec. dextr.\*  $\gamma$  spec. sinistr.) also referable to *T. virgatum* and the large number of specimens collected since, some of which have been referred to *T. Dregeanum*, A.DC., and *T. erecti-ramosum*, A.DC., all belong to *T. virgatum*, Lam., which is the *T. paniculatum* of Sonder. De Candolle has labelled some of the specimens, which he afterwards placed under *T. paniculatum*, Sond., with the name *T. cucullatum* (DC. Prodr. xiv. 656), but

\* The left-hand specimen on the sheet of *T. strictum*  $\delta$  in Herb. Thunberg is *T. euphrasioides*, A.DC.



it has seemed better to take up Lamarck's earlier name, to which a short description is attached.

The true *T. paniculatum* of Linnaeus proves to be identical with *T. tenue*, Bernhadi (Flora, 1845, p. 81), a plant belonging to the section *Barbata* and quite distinct from *T. virgatum*.

*T. debile*, Spreng., from the specimen preserved at Stockholm also appears to be a weak straggling form of *T. paniculatum*, Linn.

The confusion over the name *T. paniculatum* is further increased by the fact that there is a specimen with this name in the Thunberg Herbarium (*see* Thunb. Fl. Cap. ed. Schult. p. 210), different from any of the specimens to which reference has been made. This plant was made the type of *T. Thunbergianum* by De Candolle (Prodr. xiv. p. 666), but as Sonder very rightly points out, *T. selagineum*, A.DC. (Esp. Nouv. Thes. 3; Prodr. xiv. 658) is the same thing as Thunberg's plant and has been wrongly placed by De Candolle among the unbearded species. *T. paniculatum*, Thunb., and *T. Thunbergianum*, A.DC., have therefore been reduced to *T. selagineum*, A.DC., as it has not been possible to retain Thunberg's name.

One other point deserving of notice is that certain species appear to be vanishing or may already have been lost; *T. rigidum*, *T. diversifolium*, *T. macrostachyum* and *T. micropogon*, for instance, were all collected by Ecklon and Zeyher, but do not appear to have been found since by any other collectors. It may be that they have been entirely destroyed by bush fires. Burchell's plants in many cases are also represented by his specimens alone, but this is probably to be accounted for by the fact that many of his collecting grounds have not been revisited.

In drawing up a key to the species a good deal of use has been made of the different types of inflorescence, since on this character affinities appear to be more clearly marked for the smaller groups of species than with any other. At times, especially with the looser types of flower arrangement, it is not easy to draw a hard-and-fast distinction between loose cymose racemes and panicles, but for the general broad types the distinctions seem fairly sound. In the case of the plants with solitary or subsolitary flowers and leafy stems belonging to the bearded section (*T. rariflorum*, *T. Zeyheri*, *T. cytisoides*, *T. Burchellii*), no doubt a very artificial group has resulted, since the plants collected together probably have their allies among species with unreduced flower heads, whilst the other group with solitary flowers, including *T. sertulariastrum*, *T. paniculatum*, L. (*T. tenue* Bernh.), *T. euphrasioides*, *T. micromeria*, *T. capituliflorum* and *T. cuspidatum* appear to form a group of closely allied species.

The treatment of some of the spinous plants is also no doubt somewhat artificial, but for the sake of simplicity in drawing up the key it seems better to retain a few inconsistencies in arrangement.

In revising the genus for the *Flora Capensis* it has been found necessary not only to redraft the generic description, but also in order to prevent confusion to redefine the sections and give them fresh names.

The exact definitions of the sections follow the generic description. The section *Imberbia*, with its subsections *Subglabra* and *Fimbriata*, corresponds in the main with De Candolle's *Euthesium* and includes also his sections *Aetheotesium* and *Discothesium*. The sections *Barbata* and *Annulata* correspond with the section *Frisea*, with its two subsections and the section *Penicillata* has been formed to accommodate a type of flower not previously recognised.

De Candolle at the end of his enumeration gives certain '*species dubiae*.' These, as far as they relate to Cape plants, have been satisfactorily placed, as the types in the Stockholm Herbarium have been examined.

Of the '*species nomine tantum cognitae*' (Prodr. xiv., p. 672), the five Cape plants were collected by R. Brown and the specimens have been examined at the British Museum. It has been found that—

*T. ciliatum*, R. Br. = *T. scabrum*, Linn.

*T. crassifolium*, R. Br. = *T. Frisea*  $\beta$  *Thunbergii*, A. DC.

*T. ericoides*, R. Br. = *T. ericaefolium*, A. DC.

*T. sparteum*, R. Br. = *T. lineatum*, Linn.

*T. teretifolium*, R. Br. = *T. spinosum*, Linn.

#### EXPLANATION OF PLATES ILLUSTRATING THE DIFFERENT TYPES OF FLORAL MORPHOLOGY IN THE SOUTH AFRICAN THESIUMS.

A natural size drawing of the flower is shown with each figure.

The name and number placed in brackets refer to the specimen from which the drawing was made. All the drawings were executed by Miss M. Smith.

FIG. 1.—*T. hirsutum*, A. W. Hill (*Galpin* 1585). Longitudinal section of flower, glabrous perianth-segments, cup-like disc and elongated style. The external view shows the long perianth-tube. The anthers are attached by a tuft of hairs.

FIG. 2.—*T. triflorum*, Thuub. (*Bowker*). External view showing glands and hooded perianth-segments. In the section note the saucer-shaped, lobed disc and attached anthers.

FIG. 3.—*T. nigromontanum*, Sond. (*Ecklon & Zeyher* 17). Compare with fig. 2. Note the deep hood of the glabrous segments and short conical style. The disc is not noticeable.

FIG. 4.—*T. virens*, E. Mey (*Gerrard*). The perianth-segments are glabrous and the tube elongated. The style is very long and overtops the stamens, which are inserted on the perianth-segments. External glands not seen.

FIG. 5.—*T. laciniatum*, A. W. Hill (*Pearson* 7805). The perianth externally is minutely hirsute. Note the conspicuous external glands, the hooded perianth-segments and the two lateral flaps or lacinulae on the margins. The anther attachment-hairs are united to form a single strand.

FIG. 6.—*T. strictum*, Berg. (*MacOwan* 765). The stout perianth-segments are fringed with minute papillae. A disc is present and the anthers are attached by a tuft of hairs.



FIG. 7.—*T. Hystria*, A. W. Hill (*Galpin* 5503). The perianth-segments are fringed with long tooth-like papillae. There is a tuft of hairs behind the anthers and a short conical style not reaching to the anther level.

FIG. 8.—*T. coriarium*, A. W. Hill (*Sankey* 223). This species belongs to the section *Barbata*. The beard is dense and extends down the margins. The anthers are inserted in the tube and attached by a group of hairs. The style does not reach to the base of the anthers. The oblong glands are very large and conspicuous.

FIG. 9.—*T. asterias*, A. W. Hill (*Galpin* 1585). Note the very long perianth-segments and short tube. The segments, which are bearded only at the apex, have the incurved margins fringed with short hairs. The anthers are inserted in the tube and the stigma is sessile.

FIG. 10.—*T. carinatum*, A. DC. (*Schlechter* 8719). Note the long perianth-tube with anthers inserted at the base and the subsessile stigma.

FIG. 11.—*T. capitatum*, Linn. (*Ecklon & Zeyher* 1). The perianth-segments are stout and densely bearded. Anthers inserted about the middle of the tube with a large tuft of short attachment hairs behind. The style is elongated and reaches to the middle of the anthers. *cf.* fig. 10.

FIG. 12.—*T. acuminatum*, A. W. Hill (*Wolley Dod* 2806). A species with spreading perianth-segments in the open flowers. Note the long fleshy hood to the segments with constricted throat and anthers inserted in the tube. External glands not seen.

FIG. 13.—*T. penicillatum*, A. W. Hill (*Galpin* 4546). The perianth-segments have a conspicuous apical beard and hairy margins. The anthers are inserted in the tube and have a brush or pencil of hairs behind them, but the hairs are quite free from the anthers. Stigma subsessile. Type of the section *Penicillata*.

FIG. 14.—*T. patulum*, A. W. Hill (*Bolus* 9981). The stout perianth-segments have a fairly stiff apical beard and fringed margins. The anthers are inserted at the throat of the tube and there are no attachment hairs, but there is a ring of golden-brown hairs at the level of the anther insertion. The base to the perianth is disc-like and more or less glandular. This and the two following figures show the characters of the section *Annulata*.

FIG. 15.—*T. spicatum*, Linn. (*Bolus* 4206 B). The perianth-segments are long, stout and horny, and the apical beard is comb-like with long, stiff, stout hairs; the margins are fringed with woolly hairs. The anthers and the ring of hairs are inserted at the throat. Stigma subsessile.

FIG. 16.—*T. urceolatum*, A. W. Hill (*Schlechter* 11,138). The anthers and ring of hairs are inserted in the perianth-tube. No hairs behind the anthers. Stigma subsessile.

DESCRIPTION OF GENUS WITH KEY AND DESCRIPTION OF NEW SPECIES.

**Thesium**, Linn., Benth. et Hook. f. Gen. Pl. iii. 221.

*Flores* hermaphroditi. *Perianthium* superum, in receptaculo tubulare vel turbinato ovarium involvens cupulariforme; segmenta 5, valvata, plus minusve cucullata, intra apicem barbata vel nuda, marginibus pubescentibus papillois lacinulatis vel glabris interdum incurvis, pilorum fasciculo plerumque post antheras orto et earum apicibus adhaerente instructa vel fasciculis absentibus pilorum annulo ad filamentorum insertiones fauces perianthii cingente. *Stamina* 5, ad segmentorum bases vel in perianthii tubo inserta; filamenta brevina, gracilia; antherae ovoideae vel oblongae, loculis geminatis parallelis longitudinaliter dehiscentibus. *Discus* epigynus saepe conspicuus. *Ovarium* inferum, 3-merum, ovulis 2-4 ab placenti flexuosi gracilis apice pendulis; stylus cylindricus vel subnullus, stigmate capitato vel obscure 3-lobato coronatus. *Fructus* siccus, globosus, ellipsoideus vel obovoideus, plerumque 10-costatus, inter costas plus minusve conspicue reticulatus, perianthio persistente coronatus. *Semina* ambitu fructibus similia; embryo in centro albuminis carnosus saepe obliquus, radícula cotyledonibus aequilonga vel longiore.

*Herbae* vel suffrutices, plerumque [vel semper?], semiparasitici, glabri vel pubescentes; folia in speciebus austro-africanis lineari-lanceolata, linearia, subulata vel multo reducta et squamiformia vel spinosa, rarius suborbicularia; *inflorescentia* racemosa, spicata, paniculata, vel frequenter cymosa, laxa vel compacta, interdum floribus in capitula parva vel mediocria aggregatis; flores in axillis bractearum solitariorum dispositi bracteolis binis vel paucis additis.

*Distrib.* Species about 250, two only South American, the others inhabiting the temperate regions or the mountains of the tropical zone of the old world, about 70 extra-African.

**SECTIO I.—IMBERBIA** (sect. nov.). Perianthii segmentorum margines integri, papillois, fimbriati vel lacinulis instructi, apice ebarbati; antherae apice ad perianthii segmenta vel tubum pilis fasciculis affixae.

**SUBSECTIO 1.—Subglabra.** Perianthii segmentorum margines glabri vel papillois.

**SUBSECTIO 2.—Fimbriata.** Perianthii segmentorum margines fimbriati vel lacinulis instructi.

**SECTIO II.—BARBATA** (sect. nov.). Perianthii segmenta apice pilis dependentibus plus minusve dense barbata, marginibus plus minusve pubescentibus; antherae apice ad perianthii segmenta vel tubum pilis fasciculis affixae.

**SECTIO III.—PENICILLATA** (sect. nov.). Perianthii segmenta apice dense barbata; pilorum fasciculi post antheras liberi et ad easdem non adhaerentes.

**SECTIO IV.—ANNULATA** (sect. nov.). Perianthii segmenta apice plus minusve dense barbata, rarius papillosa; pilorum fasciculi post antheras nulli sed pilorum aureorum annulus in perianthii fauce ad filamentorum insertiones.



## SECTION I.—IMBERBIA.

Subsection i.—**Subglabra.**

Perianth-segments glabrous or fringed with minute papillae, anthers attached to segments by a tuft of hairs:—

1. Flowers usually single in the bract axils and arranged in simple terminal spikes or racemes:—

Plants with rigid spine-like branches, leaves spinous, spinulose, scale-like or, if leafy, fugacious:—

Leaves spinous or spinulose:—

Leaves stout, all spinous:—

Leaves folded, decurrent ... *T. spinosum.*

Leaves solid, terete, not decurrent ... *T. pungens.*

Upper leaves spinulose, lower linear ... *T. spinulosum.*

Leaves not spinous:—

Branchlets spinous, stems sulcate, leaves linear, fugacious ... *T. lineatum.*

Branchlets spinous, leaves scale-like ... *T. rigidum.*

Plants not spinous, herbs or subshrubs, leaves herbaceous or fleshy:—

Flowers with well-marked perianth-tube:—

Plants hairy ... *T. hirsutum.*

Plants glabrous:—

Plants with weak straggling branches ... *T. virens.*

Plants with erect stiff branches:—

Flowers pedunculate, bracts slightly adnate to peduncle, leaves hard, acutely acuminate ... *T. costatum.*

Flowers sessile, or if shortly pedunculate bracts wholly adnate, leaves herbaceous:—

Stems tall, leaves 1.2–3 cm. long ... *T. Nationae.*

Stems short, leaves 3–5, 1 cm. long ... *T. racemosum.*

Flowers without marked perianth-tube and more or less provided with a disc:—

Leaves succulent ... *T. crassifolium.*

Leaves herbaceous:—

Plants minutely scabrid ... *T. disciflorum.*

Plants glabrous:—

Flowers pedicellate in axils of leafy bracts, bracteoles very small, inflorescence indefinite, bracts not adnate to pedicels ... *T. namaquense.*

- Flowers in more or less definite terminal inflorescences, bracts more or less adnate to pedicels, bracteoles about equal in length to bracts:—
- Perianth-segments glabrous, much branched herbs or subshrubs:—
- Slender subprostrate herbs, leaves narrowly linear, acuminate, ascending *T. acutissimum.*
- Stout subshrubs, leaves broadly linear, sub-acute, recurved ... *T. squarrosum.*
- Perianth - segments with papillose margins, stout erect shrubs:—
- Plants densely leafy, bracts and bracteoles longer than flower... *T. foliosum.*
- Plants with few scattered leaves, bracts and bracteoles shorter than flowers ... *T. fruticosum.*
2. Flowers in axillary cymules arranged in many-flowered cymose heads, elongated spikes or more or less dense racemes or panicles of cymules:—
- Plant spinous ... .. *T. dissitiflorum.*
- Plant not spinous:—
- a. Flowers aggregated in compact terminal many-flowered racemose heads:—
- Leaves and bracts broadly ovate-lanceolate, leaves amplexicaul *T. euphorbioides.*
- Leaves acicular, terete ... .. *T. pinifolium.*
- β. Flowers in axillary cymules forming elongated determinate spikes or racemes, plants erect:—
- Cymules sessile in bract axils, bracts much longer than cymules ... .. *T. glomeruliflorum.*
- Cymules shortly pedunculate, compact, bracts shorter than cymules:—
- Stems winged ... .. *T. angulosum.*
- Stems not winged ... .. *T. Susannae.*
- γ. Flowers in indeterminate branched racemes, cymules 3-5-flrd, peduncles elongated, divaricately branched, plants scandent:—
- Leaves and bracts 1.2-4 cm. long:—
- Leaves and bracts broadly linear or linear lanceolate ... *T. triflorum.*



- Leaves fleshy, terete ... .. *T. scandens.*  
 Leaves and bracts less than 6 mm. long ... .. *T. galioides.*
2. Flowers in loose paniculate inflorescences:—  
 Plants scabrid ... .. *T. asperifolium.*  
 Plants glabrous:—  
 Leaves reduced; about 2 mm. long ... .. *T. corymbuligerum.*  
 Leaves well developed 0.8–4 cm. long:—  
 All leaves about 8 mm. long, numerous and recurved, bracts only slightly adnate to peduncles ... .. *T. squarrosus.*  
 Lower leaves 1.2–4 cm. long, all leaves ascending, bracts adnate for some distance to peduncles:—  
 Stems sharply ribbed, leaves and bracts keeled, cymes lax ... .. *T. floribundum.*  
 Stems slightly ribbed, leaves and bracts more or less rounded on back, cymes compact ... .. *T. pallidum.*
3. Flowers arranged in small terminal cymose heads or clusters:—  
 Branches fairly densely leafy; leaves well-developed, fruits not or scarcely reticulate between ribs, bracts glabrous:—  
 Branches erect, perianth without external glands ... .. *T. quinqueflorum.*  
 Branches spreading, perianth with conspicuous external glands:—  
 Leaves imbricate, bracts and bracteoles longer than flowers, inflorescences inconspicuous .. .. *T. cupressoides.*  
 Leaves lax, bracts and bracteoles equal to or shorter than flowers, inflorescences conspicuous ... .. *T. ericaefolium.*
- Branches very sparingly leafy or nearly leafless, leaves small and bract-like, bract-margins finely serrulate:—  
 Stigma subsessile, bracts equal to or longer than flowers:—  
 External glands conspicuous, bracts acutely acuminate ... .. *T. nigromontanum.*  
 External glands not seen, bracts acute:—  
 Perianth - segments glabrous, lower leaves 2–4 mm. long *T. leptocaulis.*

- Perianth-segments with papillose margins; lower leaves up to 1.2 cm. long ... *T. commutatum.*
- Style 0.6 mm. or more long, bracts about half the length of flowers:—
- Leaves few, scale-like, ovate-triangular, 1.8 cm. long ... *T. nudicaule.*
- Leaves well-developed, oblong-lanceolate, 6 mm. long, flat, obtuse or subacute ... *T. Schumannianum.*
4. Flowers arranged in compact corymbose or umbellate inflorescences, leaves few, scattered:—
- Plants slender, rush-like, leaves subulate, rarely a few narrowly linear basal leaves; perianth 1–1.5 mm. long, margins of segments minutely papillose or subglabrous, corymbs few-flowered:—
- Leaves almost absent, branchlets leafless, below corymbs ... *T. juncifolium.*
- Leaves subulate, fairly numerous on branchlets below corymbs ... *T. virgatum.*
- Plants, stout, woody, leaves somewhat fleshy linear-lanceolate, conspicuous, towards base up to 6.5 cm. long; perianth 1.8–4 cm. long, margins of segments more or less conspicuously papillose, corymbs many-flowered:—
- Perianth 3.5–4 mm. long, fringe of papillae conspicuous, anthers 0.8 mm. long, style 1 mm. long ... *T. occidentale.*
- Perianth 1.5–2.5 mm. long, papillae short, anthers 0.3 mm. long, style 0.5 mm. long ... *T. strictum.*

#### Subsection ii.—*Fimbriata.*

- Perianth-segments with a marginal fringe of long papillae or with two lateral lacinulae but no apical beard. Anthers with attachment hairs. Plants usually rigid, woody, spinescent:—
- Margins of perianth-segments with lacinulae:—
- Stems rigid, spinescent, puberulous ... *T. lacinulatum.*
- Stems flexuous, herbaceous, glabrous ... *T. pleurolooma.*
- Margins of perianth-segments fimbriate with fringe of long papillae:—
- Branchlets spinescent, ascending, crowded, covered with imbricate adpressed leaves ... *T. horridum.*
- Branchlets spinescent, spreading, leaves scale-like:—
- Plants covered with minute hairs ... *T. hystrioides.*
- Plants glabrous ... *T. Hystrix.*



## SECTION II.—BARBATA.

Perianth-segments with a dense apical beard of stiff or woolly hairs, anthers attached to the segments or tube by a tuft of hairs:—

1. Flowers solitary or in small 3-5-flowered clusters at the ends of main and axillary branches, bracts forming an involucre, leaves reduced to scales, rarely narrowly linear or acicular leaves also present:—

Flowers solitary:—

Plants minutely puberulous ... *T. sertulariastrum.*

Plants glabrous:—

Plants slender, profusely branched with scale and numerous long narrowly linear leaves ... *T. paniculatum.*

Plants stout, upper leaves all scale-like, a few stout acicular leaves below ... *T. euphrasioides.*

Flowers in small clusters:—

Anthers exserted ... *T. micromeria.*

Anthers included in perianth tube:—

Bracts much shorter than flowers, ovate-lanceolate with blackish acuminate tips, leaves adpressed, all subulate-acuminate ... *T. capituliflorum.*

Bracts nearly as long as flowers, ovate-elliptic with membranous margins, leaves somewhat spreading acicular to triangular-lanceolate ... *T. cuspidatum.*

2. Flowers solitary or in groups of 2 or 3 at ends of branches, bracts not forming involucre, all leaves well developed:—

Anthers included in perianth tube ... *T. rariflorum.*

Anthers exserted:—

Flowers over 4 mm. long, style exceeding 2 mm. long ... *T. Zeyheri.*

Flowers not exceeding 2.5 mm. long, style 0.5-1 mm. long:—

Branches erect, fastigate, leaves scattered, bracts as long as flowers ... *T. cytisoides.*

Branches spreading, densely leafy, bracts longer than flowers ... *T. Burchellii.*

3. Flowers in small terminal or subterminal heads or clusters; plants more or less prostrate, much branched:—

Leaves few and more or less scale-like, especially at ends of branches:—

Lower leaves not scale-like, anthers included in perianth tube ... *T. repandum.*

- Leaves nearly all reduced to scales,  
anthers exerted ... .. *T. glaucescens.*
- Leaves numerous, acicular or linear-lanceolate, equally distributed over the stem:—
- Stems and leaves scabrid-puberulous *T. hispidulum.*
- Stems and leaves glabrous:—
- Leaves acicular, acute, ascending:—
- Plants lax, spreading, anthers exerted ... .. *T. prostratum.*
- Plants stout, much branched, anthers included in tube ... *T. acuminatum.*
- Leaves linear-lanceolate, flattened above, recurved, scattered or densely imbricate:—
- Plants slender, spreading, much branched, anthers exerted *T. selagineum.*
- Plants stout, branches few, ascending, anthers included:—
- Leaves scattered, stigma subsessile ... .. *T. capitellatum.*
- Leaves densely imbricate, style 1.5 mm. long ... *T. imbricatum.*
4. Flowers arranged in simple terminal spikes, racemes or in cymose or loose paniculate racemes:—
- a. Flowers in simple spikes or racemes, bracts not adnate to peduncles:—
- Stems rush-like, leaves scale-like or rarely linear-subulate, bracts with hyaline, scurfy or finely fringed margins:—
- Flowers in lax spikes, bracts with scurfy or hyaline margins:—
- Apical beard of dense woolly hairs, anthers included in perianth-tube:—
- Bracts and leaves ovate, scales with broad scurfy margins *T. junceum.*
- Bracts with membranous margins sometimes with slight scurfy edge:—
- Bracts subulate, acutely acuminate, leaves linear-subulate ... *T. natalense.*
- Bracts broadly ovate, acute, leaves ovate scales ... .. *T. scirpioides.*



- Apical beard of stiff comb-like hairs, anthers partly exerted:—
- Slender annuals, 10–12 cm. high, inflorescences lax.. *T. paronychioides.*
- Straggling much branched undershrub, 30 cm. high, inflorescences compact, often branched ... *T. flexuosum.*
- Flowers in short more or less dense spikes, bracts with finely fringed margins:—
- Stems slender, ascending, brown when dry ... *T. spartioides.*
- Stems stout flexuose or prostrate, grey when dry ... *T. confine.*
- Stems leafy, leaves well developed, bracts with entire or rarely scabrid margins, never scurfy:—
- Flowers in compact dense spikes, style 0.5 mm. long, bracts equal to or longer than the flowers:—
- Plants finely pubescent:—
- Leaves rounded on back, perianth externally glabrous ... *T. griseum.*
- Leaves ribbed, perianth externally hairy ... *T. transvaalense.*
- Plants glabrous:—
- Bracts finely scabrid-puberulous on margins ... *T. gnidiaceum.*
- Bracts glabrous on margins:—
- Stigma sessile or subsessile, anthers in perianth tube *T. phyllostachyum.*
- Style 0.5 mm. long, anthers exerted ... *T. impeditum.*
- β. Flowers in elongated lax spikes, style 0.8 mm. or more long, bracts shorter than flowers ... *T. magalismontanum.*
- γ. Flowers in racemes, bracts adnate to peduncles:—
- Bracts equal to or longer than flowers:—
- Styles 1 mm. long or more, leaves scattered:—
- Bracts with minutely serrulate or scabrid margins:—
- External glands conspicuous:—
- Perianth 2–2.5 mm. long (flowers often in cy- mules) ... *T. Burkei.*

- Perianth 4 mm. or more long ... *T. orientale.*
- External glands not present:—
- Bracts equal in length to flowers, rounded on back, minutely serrulate ... *T. macrogyne.*
- Bracts longer than flowers, keeled, margins membranous scabridulous. *T. lobelioides.*
- Bract margins entire, glabrous:—
- External glands scarcely visible:—
- Bracts keeled, leaves erect. *T. Goetzeanum.*
- Bracts rounded on back, leaves recurved ... *T. resedoides.*
- External glands conspicuous:—
- Plants slender, leaves narrowly linear, curved... *T. Junodii.*
- Plants stout, leaves straight:—
- Perianth over 4 mm. long, segments flat without hood, bracts elliptic - lanceolate, obtuse ... *T. coriarium.*
- Perianth 3 mm. long, with deep hood, bracts lanceolate, acute ... *T. nigrum.*
- Styles very short, stigma subsessile, plants densely leafy ... *T. gracillarioides.*
- Bracts much shorter than the flowers, stigma sessile:—
- Plants branching from the base, leafy, perianth 2.8-3.5 mm. long ... *T. asterias.*
- Plants branching above, sparingly leafy, perianth 1.5 mm. long *T. polygaloides.*
8. Flowers usually in 3-flowered pedunculate cymules in bract axils arranged in racemes:—
- Leaves with recurved tips ... *T. resedoides.*
- Leaves straight:—
- Bracts longer than cymules, adnate for some length to peduncles. *T. Burkei.*
- Bracts shorter than the cymules, slightly adnate to peduncles:—
- Racemes elongate, distinct, perianth glands conspicuous, style reaching to top of anthers ... *T. cornigerum.*
- Racemes short, glands not seen, style below base of anthers *T. palliolatum.*

## c. Flowers in loose paniculate racemes:—

Plants lax with spreading leafy branches, leaves linear-lanceolate, bracts longer than flowers

*T. gypsophiloides.*

Plants stiff erect, with erect branches, leaves scattered, narrowly linear, bracts shorter than flowers ...

*T. utile.*

## 5. Flowers in compact rounded heads, short compact spikes or dense corymbose heads or clusters, leafy subshrubs:—

## a. Flowers in corymbose heads or clusters:—

Bracts conspicuous, stigma sessile:—

Bracts broadly oblanceolate with conspicuous translucent margins, foxy-red ...

*T. fallax.*

Bracts lanceolate, margins inconspicuous, greenish-yellow ...

*T. helichrysoides.*

Bracts inconspicuous, style elongate

*T. umbelliferum.*

## β. Flowers in rounded heads or compact spikes:—

Leaves and bracts covered with a fine pubescence:—

Leaves adpressed to stem, stigma sessile ...

*T. Boissieranum.*

Leaves spreading, style elongate:—

Leaves very dense, bracts green, flowers in rounded heads...

*T. pubescens.*

Leaves more scattered, bracts ruddy, flowers in compact spikes ...

*T. rufescens.*

Leaves and bracts with scabrid margins ...

*T. scabrum.*

Leaves and bracts glabrous:—

Stems woody, flowering branches with leaves remote ...

*T. polycephalum.*

Stems herbaceous, leaves numerous:—

Leaves imbricate, adpressed, stout, obtuse ...

*T. microcephalum.*

Leaves somewhat spreading, linear, acute to acuminate

*T. pycnanthum.*

Leaves glabrous, bracts with broad hyaline and more or less scarious or rarely finely scabrid-puberulous margins:—

Stems prostrate ...

*T. Ecklonianum.*

Stems erect:—

Inflorescences dense spikes:—

Leaves recurved, bracts glabrous, style elongate ...

*T. Sonderianum.*



Leaves erect, bracts finely  
scabrid - puberulous on  
margins, stigma subsessile ... .. *T. gnidiaceum*.

Inflorescences globular or corymbose heads, leaves erect or slightly spreading:—

Style elongate, 1·8–3·4 mm. long:—

Stems densely leafy especially near flower-heads ... .. *T. capitatum*.

Stems with more or less scattered leaves, very few below the flower heads ... .. *T. glomeratum*.

Style short, 0·5 mm. long, perianth-tube markedly shorter than the segments ... .. *T. fimbriatum*.

Stigma sessile:—

Perianth-tube very short, segments elongate, with a small beard at apex and papillose margins ... .. *T. translucens*.

Perianth - segments with dense woolly beard, tube well marked:—

Bracts broadly ovate-lanceolate, leaves scattered ... .. *T. densiflorum*.

Bracts lanceolate, leaves crowded, imbricate.. ... .. *T. carinatum*.

### SECTION III.—PENICILLATA.

Perianth segments with dense apical beard, anthers free, but with a pencil of free hairs on the segments behind anthers:—

Only South African species... .. *T. penicillatum*.

### SECTION IV.—ANNULATA.

Perianth with a ring of hairs at the throat, anthers without attachment hairs, segments with apical beard or rarely with papillose margins:—

1. Flowers in elongated spikes or racemes:—

Perianth-segments with papillose margins ... .. *T. micropogon*.

Perianth-segments bearded:—

Anthers included in perianth-tube.. ... .. *T. urceolatum*.

Anthers exserted:—

Plants with numerous stout spreading branches almost at right angles to stem, style 0·5 mm. long ... .. *T. patulum*.

- Plants sparingly branched, branches erect, stigma sessile:—  
 Plants slender, bracts small, subulate, perianth 1.5 mm. long ... .. *T. funale*.  
 Plants stout, bracts leaf-like, perianth above 2 mm. long *T. macrostachyum*.
2. Flowers in heads or short spicate clusters:—  
 Flowers in rounded heads or dense compact spikes with imbricate conspicuous bracts, perianth-segments with an apical beard of stiff comb-like hairs:—  
 Bracts distinctly toothed on margins:—  
 Upper leaves numerous, lanceolate, recurved at tip ... .. *T. diversifolium*.  
 Upper leaves few, subulate, ascending ... .. *T. aggregatum*.  
 Bracts quite entire, usually reddish-brown when dry:—  
 Spikes stout, oblong or subcapitate, bracts broadly ovate, plants leafy:—  
 Spikes mostly oblong, bracts broadly ovate, sharply keeled, upper leaves linear-subulate ... .. *T. spicatum*.  
 Spikes mostly depressed-capitate, bracts lanceolate, not sharply keeled, upper leaves linear ... .. *T. bathyschistum*.  
 Spikes rather slender, often elongated, bracts linear-lanceolate, plants with few leaves.. *T. subnudum*.
3. Flowers in more or less lax heads or spicate clusters, bracts inconspicuous, perianth-segments with dense woolly beard:—  
 Style above 0.5 mm. long ... .. *T. elatius*.  
 Stigma sessile:—  
 Bracts with fringed margins ... .. *T. Frisea*.  
 Bracts with entire margins:—  
 Leaves more or less crowded, adpressed to stem, somewhat fleshy ... .. *T. annulatum*.  
 Leaves scattered spreading:—  
 Leaves narrowly linear, flower-heads globose; few-flowered *T. brachygynae*.  
 Leaves broadly linear, flowers in ovoid spikes, many-flowered *T. Patersonae*.
-

The descriptions of the new species and varieties are placed in alphabetical order.

**T. acuminatum**, A. W. Hill; species distincta, *T. capitulifloro*, Sond., similis, perianthii segmentis apice longe acicularibus repandis dense barbatis, foliisque acicularibus differt.

*Rhizoma* gracile, erectum, subteres, circiter 3-5 mm. crassum; caules e rhizomate numerosi, patuli vel ascendentes, subteretes, glabri. *Folia* acicularia, acuta, 0.8-2.5 cm. longa, subteretia, glabra. *Flores* in glomerulos subdensos terminales dispositi. *Bracteae* triangulari-lanceolatae, acutae, carnosae, 2-3 mm. longae, glabrae; bracteolae floribus circiter dimidio breviores. *Perianthii segmenta* 1.5 mm. longa, lineari-lanceolata, apice longe acicularia, repanda, inferne dense adpresse barbata. *Antherae* ad perianthii tubi basin inclusae, 0.5 mm. longae. *Stylus* 0.25 mm. longus. *Fructus* ovoideo-globosus, circiter 4 mm. longus, tenuiter costatus et reticulatus.

Cape Div.; near Noah's Ark Battery, Simonstown, Sept., *Wolley Dod* 2806! 3016! Simon's Bay, *Wright* 536! hills west of Simonstown, Oct., *Wolley Dod* 1879! Muizenberg, 320 m., Aug., *Bolus* 8040! Constantiaberg, 550 m., *Schlechter* 543! Steenberg Flats, July, *Wolley Dod* 2741! 'Cape,' *Hooker* 608! *Reynoud ex herb. Kunth. in herb. Berol.*

The spreading perianth segments with their elongated acicular tips are a marked feature of this species, *see fig. 12.*

**T. aggregatum**, A. W. Hill; species *T. diversifolio*, Sond., et *T. spicato*, L., affinis, ab illa bracteis margine fimbriatis, ab hac foliis superioribus paucis subulatis ascendentibus praecipue differt.

*Caules* et rami ascendentes, subteretes, glabri. *Folia* parva, plana, ad caulem appressa, lanceolata vel lineari-lanceolata, acuta, 3-4 mm. longa, rigida, sicco nigrescentia, glabra. *Flores* in capitulos terminales subcapitados vel spicas oblongo-lineares conferti. *Bracteae* ovatae, acute acuminatae, costa lata carnosae, marginibus subtranslucentibus viridibus lacerato-denticulatis, glabrae; bracteolae floribus aequales sed multo angustiores, ceterum eis similes. *Perianthium* 3-4 mm. longum, intra faucem pubescens; segmenta circiter 3 mm. longa, linearia, subacuta, apice rigide pectinato-barbata. *Antherae* e perianthii tubo exsertae, 0.5 mm. longae. *Stigma* sessile. *Fructus* ellipsoideus, 6 mm. longus, prominenter 10-costatus, inter costas delicate reticulatus.

Vanrhynsdorp Div., Windhoek, 305 m., Aug., *Schlechter* 8348! Clanwilliam Div.; Lammkraal, 375 m., Sept., *Diels* 779! Malmesbury Div.; near Hopefield, Sept., *Bachmann* 1694! 1695! Darling, 30 m., Oct., *Schlechter* 5337! Cape Div., near Capetown, 30 m., June, *Bolus* 1360! Wynberg, Oct., *Bolus* 2931! 25 m., Feb., *Schlechter* 7545! Muizenberg, 300 m., Jan., *Bolus* 2933 partly! Kenilworth, 30 m., Jan., *Bolus* 7049! Hertzog House Retreat, Dec., *Wolley Dod* 2364! near Vygerskraal, Dec., *Wolley Dod* 2371! South Africa; without precise locality, *Wallich*! *Osbeck in Herb. Stockholm*! *Zeyher* 4879!



**T. annulatum**, A. W. Hill; species sectionis *Annulatae* foliis densis subimbricatis distincta.

*Planta* parva, probabiliter usque ad 10 cm. alta, e basi ramosa; rami pauci, ascendentes, subteretes, glabri, in parte inferiore foliis nigrescentibus persistentibus induti. *Folia* subdense disposita, cum caule subparallela, linearia vel lineari-lanceolata, acuta, 4-6 mm. longa, supra concava vel plana, infra rotundata, crasse carnosae, glabra. *Flores* in capitula densa subglobosa 6-8 mm. diametro dispositi. *Bracteae* lineari-oblongae, acutae, floribus subaequales, carnosae, leviter carinatae; bracteolae bracteis subaequales sed angustiores. *Perianthium* 2.5 mm. longum, glandulis externis conspicuis et intra faucem pilorum annulo instructum; segmenta ovata, obtusa, 1.5 mm. longa, plana, apice dense lanato-barbata. *Antherae* 0.4 mm. longae, e perianthii tubo leviter exsertae. *Stigma* subsessile. *Fructus* non visus.

Worcester Div.; Matroosberg, 2000 m., Dec., Marloth 2252 partly (Herb. Marloth, not of herb. Bolus)!

**T. asperifolium**, A. W. Hill; species *T. pallido*, A.D.C., affinis, ramis et foliis scabridulis praecipue differt.

*Suffrutex* vel herba. *Caules* ramosi, tenues, circiter 40 cm. alti, angulares, scabriduli; rami ascendentes, foliosi, scabriduli. *Folia* linearia vel lineari-lanceolata, subacuta, circiter 1.8 cm. longa, carinata, scabridula. *Flores* in cymas laxas dispositi; bracteae plus minusve lanceolatae, acutae, floribus aequales vel paulum longiores, dorso et marginibus scabridulae; bracteolae floribus breviores. *Perianthium* 1.5-1.75 mm. longum, segmentis ovatis subacutis 0.75-1 mm. longis subcucullatis. *Discus* conspicuus. *Antherae* e perianthii tubo exsertae, 0.25 mm. longae. *Stylus* crassus, 0.35 mm. longus. *Fructus* globosus, 4 mm. longus, costis conspicuis reticulationibus laevibus.

George Div.; on hill near George, Schlechter 2358! Queens-town Div.; Table Mountain, Drège 8170b!

**T. asterias**, A. W. Hill; species perianthii segmentis elongatis apice barbatis marginibus incurvis tenuiter pubescentibus, stigmate sessili discreta.

*Rhizoma* crassum, multi- vel pauci-cephalum; caules erecti, superne ramosi, compressi et angulati, sicco purpurei, glabri. *Folia* acicularia, supra canaliculata, acuta, 0.6-2.5 cm. longa, 0.6 mm. crassa, glabra. *Flores* in racemos laxos vel cymularum racemos dispositi. *Bracteae* pedunculo partim adnatae, lineares, acutae, usque ad 5 mm. longae, floribus breviores vel longiores; bracteolae floribus breviores. *Perianthium* 3.5 mm. longum, glandulis magnis rotundatis externis instructum; segmenta lanceolata, 2.5 mm. longa, apice barbata, marginibus incurvis tenuiter pubescentibus. *Antherae* 0.5 mm. longae, ad segmentorum basin exsertae. *Stigma* sessile. *Fructus* ovoideus, perianthio longo persistente 7 mm. longus, prominenter 10-costatus, inter costas tenuiter reticulatus.

Transvaal; Shilouvane, Junod 749a! Champs du Sanatorium, Junod 837! Aapies Poort, Pretoria, Rehmann 4013! Houtbosch, Rehmann 5958! 5959! Swaziland; Havelock Concession,

1220 m., *Saltmarsh* 1008 (in Herb. Galpin)! Natal; Gerrard 333! *Sanderson* 916! near Murchison, *Medley Wood* 3003!

The elongated perianth segments are a conspicuous feature in this species, with the relatively small beard at the apex and finely puberulous margins. The external glands are also well developed. See fig. 9.

**T. Burchellii**, A. W. Hill; species ramulis lateralibus numerosis dense foliatis, floribus solitariis ad ramulorum apices dispositis distincta.

*Planta* fruticosa; rami (vel caules?) leviter angulati, pallide brunnei, glabri; ramuli laterales satis dense foliosi, ascendentes. *Folia* linearia vel lineari-acicularia, apice cartilaginea, acuta, 7-10 cm. longa, subteretia vel subangularia, glabra. *Flores* ad ramulorum apices solitarii vel subsolitarii. *Bracteae* floribus longiores, lineares, foliis similes; bracteolae flores aequantes vel eis paullo longiores. *Perianthium* 2 mm. longum, extra eglandulosum; segmenta ovato-elliptica, subacuta, 1.5 mm. longa, cucullata, apice barbata. *Antherae* e perianthii tubo exsertae, 0.5 mm. longae. *Stylus* 1 mm. longus, ad antherarum apices attingens. *Fructus* ellipsoideus, basi acutus, 6 mm. longus, prominenter 10-costatus, inter costas reticulatus.

Bechuanaland; near the source of the Kuruman River at Little Klibbolikhonni, *Burchell* 2504!

**T. Burkei**, A. W. Hill; species floribus in racemos vel cymularum racemos dispositis, *T. orientali*, A. W. Hill et *T. palliotato*, A. W. Hill, affinis, ab illa perianthiis minoribus, ab hac bracteis elongatis pedunculis longe adnatis praecipue differt.

*Caules* graciles, sulcati vel carinati, glabri. *Folia* linearia, acuta, circiter 9 mm. longa, glabra. *Flores* in cymulas 1-3-floras pedunculatas racemosas laxas dispositi; bracteae pedunculi apice adnatae, lineares, acutae, floribus circiter aequales, marginibus minutissime scabridis; bracteolae quam bractea paullo breviores. *Perianthium* 1-2.25 mm. longum, glandulis externis conspicuis instructum; segmenta lineari-lanceolata, subacuta, circiter 1.25 mm. longa, apice barbata, marginibus incurvis. *Antherae* e perianthii tubo exsertae, 0.5 mm. longae. *Stylus* circiter 0.75-1 mm. longus, ad antherarum apices attingens. *Fructus* ellipsoideus, 4 mm. longus, valide 10-costatus, inter costas reticulatus.

Bechuanaland; near the sources of Kuruman River, *Burchell* 2493! Barolong Territory, May, *Holub*! Transvaal; Kimberley, *Marloth*! Magaliesberg, *Burke*! *Zeyher* 1500 partly in Herb. Kew! Boshveld, between Elands River and Klippan, *Rehmann* 5013! near Komati Poort, Aug., *Bolus* 9765! Dec., 330 m., *Schlechter* 11803. Delagoa Bay; Temb , Sept., *Junod* 325! Natal; near Maritzburg, Sept., *Schlechter* 3288! without precise locality, *Sanderson*! coastland, up to 350 m., Feb., *Sutherland*!

**T. coriarium**, A. W. Hill; species foliis et bracteis coriariis, bracteis elliptico-lanceolatis, glandulis externis magnis distincta.

*Caules* e rhizomate nodoso parvo solitarii vel subsolitarii, parce ramosi, erecti, circiter 10 cm. longi, prominenter costati, subglaucci, glabri. *Folia* pauca, late linearia, obtusa vel subacuta, 0.8-1.3 cm. longa, 1.5-2 mm. lata, infra leviter carinata et glauca, glabra, crassa, carnosa. *Flores* albi, pauci, in racemos laxos dispositi, in bractearum axillis solitarii. *Bracteae* pedunculo usque ad 2 mm. longo adnatae, elliptico-lanceolatae, obtusae, plus minusve cymbiformes, floribus longiores, integrae; bracteolae bracteis paullo breviores. *Perianthium* 5 mm. longum, glandulis externis magnis conspicuis instructum; segmenta ovato-lanceolata, obtusa, 2.5 mm. longa, apice pilis lanatis dense barbata. *Antherae* ad tubi apicem inscitrae, 1 mm. longae. *Stylus* 1 mm. longus, ad antherarum basin attingens. *Fructus* non visus.

Orange River Colony; Harrismith, Nov., *Sankey* 223!

The large external glands are a conspicuous feature in this species (see fig. 8) and appear to be the largest examples in the genus. The apical beard is also dense and the long hairs extend down the margins of the perianth segments. In its leathery leaves and bracts in addition to the above-mentioned features this species stands somewhat apart from all others.

**T. cornigerum**, A. W. Hill; species *T. palliolato*, A. W. Hill, affinis, sed racemis elongatis distinctis, cymulis cornigeris, glandulis conspicuis facile distinguenda.

*Caules* elongati, pergraciles, sulcatuli, glabri; rami interdum omnino floriferi. *Folia* linearia, acutissima, 1.5-2.5 mm. longa, supra 1-nervia, glabra. *Cymulae* racemose dispositae, 3-multi-florae. *Bracteae* floribus breviores, corneis similiter dispositae, lineares, acutae, pedunculo breviter adnatae; bracteolae bracteis multo breviores sed ceterum eis similes. *Perianthium* 1.5 mm. longum, glandulis ovoideis externis prominentibus instructum; segmenta 1.25 mm. longa, ovato-oblonga, subacuta, cucullata, apice barbata, marginibus papillosis. *Antherae* e perianthii tubo exsertae, 0.5 mm. longae. *Stylus* 0.5 mm. longus, ad antherarum apices attingens. *Fructus* non visus.

Natal; Mooi River, 1200-1530 m., Apr., *Medley Wood* 4487! 5344! near Stanger, 50 m., *Medley Wood* 10,193! Natal and Zululand, without precise locality, *Gerrard* 1278.

**T. costatum**, A. W. Hill; species *T. racemoso*, Bernh., affinis, foliis costatis rigidis, floribus pedunculatis distinguenda.

*Rhizoma* gracile, erectum; caules pauci vel subnumerosi, superne ramosi, costati vel angulares, glabri. *Folia* laxè disposita, linearia, acute acuminata, 0.6-1.2 cm. longa, plana, utrinque costa prominente, glabra. *Cymulae* 1-3-florae. *Bracteae* pedunculo breviter adnatae, 0.6-1 cm. longae, ceterum foliis similes; pedunculi bracteis breviores vel paulum longiores, compressi, subgraciles; bracteolae floribus breviores vel longiores, lineares, acutae, glabrae. *Perianthium* 2.5-3 mm. longum; segmenta triangulari-lanceolata, 1.5 mm. longa, cucullata, marginibus fimbriatis membranaceis, cucullo rostrato et leviter papilloso. *Antherae* 0.75 mm. longae. *Stylus* 1.5 mm. longus, antheris superans. *Fructus* campanulato-globosus, perianthio persistente



incluso circiter 6 mm. longus, prominenter 10-costatus, inter costas crasse reticulatus.

Orange River Colony; Bethlehem, *Richardson*! Basutoland; Leribe, Dec., *Dieterlen* 647! Transvaal; near Pretoria, Nov., *Wilms* 1308a! Swaziland; near Bremersdorp, 780 m., Jan., *Bolus* 12,273! near Mbabane, 1410 m., Jan., *Bolus* 12,277! Griqualand East; *Tyson*! Natal; near Camperdown, 1000 m., Dec., *Schlechter* 3284! Weenen, 1050 m., Jan., *Wood* 3582! between Pietermaritzburg and Greytown, Nov., *Wilms* 2252! near Pietermaritzburg, *Wilms* 2254! near Emberton, Dec., *Schlechter* 3239! Inanda, *Wood* 1141! without precise locality, *Gerrard* 1281!

var. *juniperina*, A. W. Hill, var. nov.; folia in ramis dense conferta, quam typus plus acuta.

'Natal and Zululand,' *Gerrard* 1280!

**T. cupressoides**, A. W. Hill; species *T. ericacfolio*, A.DC., affinis, foliis planis longioribus conspicue differt.

*Suffrutex* dense ramosus, glaber, circiter 20 cm. altus, ramis lignosis ascendentibus, ramulis numerosis foliolosis. *Folia* linearia, acuta, 4-7 mm. longa, supra plana, infra paullo carinata, subcarnosa, glabra. *Flores* ad ramulorum apices in inflorescentias breves aggregati; bracteae et bracteolae lanceolatae, floribus longiores. *Perianthium* 1.5 mm. longum, disco et glandulis externis conspicuis instructum, segmentis ovatis obtusis 1 mm. longis cucullatis glabris. *Antherae* 0.2 mm. longae, e perianthii tubo exsertae. *Stigma* subsessile. *Fructus* ignotus.

Natal; Niginya, 1680 m., *Wylie in Herb. Wood* 10,618!

**T. cuspidatum**, A. W. Hill; species *T. capitulifloro*, Sonder, affinis, plantis robustioribus, foliis bracteis et floribus majoribus praecipue differt.

*Frutex* humilis, lignosus, multo ramosus. *Caulis* subteres, glaber; rami leviter costati. *Folia* pauca et sparsa; inferiora acicularia, apice subacuta et cartilaginea, circiter 1-3 cm. longa, subteretia, glabra; superiora suberecta ad caulem plus minusve adpressa, triangulari-lanceolata, acuta, circiter 4 mm. longa. *Flores* ad ramulorum apices glomerati, subcorymbosi. *Bracteae* et bracteolae confertae; bracteae obovato-ellipticae, cuspidato-acuminatae, floribus fere aequilonges, marginibus membranaceis subscariosis; bracteolae bracteis similes sed eis minores et paulum angustiores. *Perianthium* 2-2.5 mm. longum; segmenta lanceolato-triangularia, acuta, cucullata, apice lanato-barbata. *Antherae* 0.5 mm. longae, in perianthii tubo inclusae. *Stylus* 0.25-0.3 mm. longus, robustus, ad antherarum bases vel paulum supra attingens. *Fructus* ellipsoideo-globosus, perianthio persistente longe rostratus, 4 mm. longus, prominenter 10-costatus, inter costas conspicue reticulatus.

Cape Div.; south-west part of Devil's Peak, Aug., *Wilms* 3611! Caledon Div.; Zwart Berg, *Ecklon and Zeyher* 47! Bredasdorp Div.; Elim, 150 m., Apr., *Schlechter* 7664! (in Herb. Bolus. 7666 & in Herb. Berol.). Riet Fontein Poort, near Elim, Dec., 45 m., *Bolus* 8597!

**T. cytisoides**, A. W. Hill; species ramis elongatis foliosis erectis, floribus solitariis terminantibus distincta.

*Caules* pauci, e rhizomate ramoso orti, erecti, profunde sulcati et costati, glabri; rami erecti, parce foliosi. *Folia* anguste lineari-acicularia, acuta, 0.8-1.2 cm. longa, circiter 0.5 mm. crassa, sicco verrucosa, supra costa crassa prominente. *Flores* ad ramorum apices solitarii, sessiles. *Bracteae* pedunculo partim adnatae, lineares, acutae, flores subaequantes; bracteolae floribus breviores, lineari-subulatae, carnosae, glabrae. *Perianthium* 2.5 mm. longum; segmenta ovato-lanceolata, 1.5 mm. longa, cucullata, apice pilis paucis longis barbata. *Antherae* e perianthii tubo exsertae, 0.75 mm. longae. *Stylus* 0.5 mm. longus. *Fructus* ellipsoideus, 5 mm. longus, sicco rubro-brunneus et prominenter costatus, inter costas non reticulatus.

Transvaal; Waterval Onder, Jan., *Jenkins in Herb. Mus. Transvaal* 6767!

**T. disciflorum**, A. W. Hill; species *T. acutissimo*, A.DC., affinis, sed omnino minute scabrida differt.

*Caules* debiles, probabiliter procumbentes, e basi multo ramosi; rami graciles, subteretes, minute scabridi, sicco rubro-brunnei. *Folia* numerosa, linearia, acute mucronata, 4-6 mm. longa, infra convexa, supra plana, demum recurvata, minute scabrida, satis carnosae. *Flores* solitarii. *Bracteae* et bracteolae floribus longiores; bracteae foliosae, pedunculo adnatae; pedunculi brevissimi; bracteolae 2, bracteis circiter dimidio breviores, acute mucronatae. *Perianthii segmenta* triangularia, 0.75 mm. longa, cucullata, glabra. *Antherae* e perianthii tubo exsertae. *Stylus* 0.75 mm. longus, ad antherarum basin attingens. *Fructus* ellipsoideus, perianthio persistente coronatus, 4 mm. longus, 2 mm. diametro, costatus et reticulatus, glaber.

Graaff-Reinet; in grassy places on Mt. Tandjesberg, *Bolus* 1967!

**T. fimbriatum**, A. W. Hill; species ex affinitate *T. capitato*, L., et *T. carinato*, A.DC., foliis sparsis, perianthii tubo lobisque brevioribus, stylo breve distinguenda.

*Frutex* parvus circiter 30 cm. longus, e basi ramosus; rami ascendentes, foliorum basibus persistentibus asperati. *Folia* linearia, subacuta, inferne ad caulem arcte adpressa, superne leviter recurvata, 6-8 mm. longa, supra plana, infra leviter carinata, glabra. *Flores* in glomerulos capitatos terminales densos 0.8-1. cm. diametro dispositi. *Bracteae* late ovatae, acute acuminatae, floribus longiores, marginibus membranaceis fimbriatis; bracteolae bracteis similes sed multo angustiores et breviores. *Perianthium* 3.25 mm. longum, glandulis externis conspicuis instructum; segmenta lineari-lanceolata, 2.5 mm. longa, cucullo conspicuo 1 mm. longo, pilis brevibus paucis barbata. *Antherae* in perianthii tubo inclusae, 0.5 mm. longae. *Stylus* 0.5 mm. longus, ad antherarum medium attingens.

Tulbagh Div.; eastern base of the Roodesand Mts., 150 m., Sept., *Diels* 1125!

**T. floribundum**, A. W. Hill; species *T. pallido*, A.DC., affinis

ramulis acute costatis, foliis et bracteis carinatis, cymulis laxis elongatis praecipue differt.

*Caules* erecti, e medio ramosi, prominenter costati, glabri; rami ascendentes, graciles, flexuosi. *Folia* linearia, acuta, 0.8–2.5 cm. longa, ad 1 mm. lata, subcarnosa, glabra. *Inflorescentia* e cymulis 3–5 floris constituta, in ramorum parte superiore paniculata. *Bractene* pedunculo breviter adnatae, foliosae, carinatae; bracteolae floribus longiores, lineari-lanceolatae, acutae. *Perianthium* 1.5 mm. longum, disco interno instructum; segmenta triangularia, 0.75 mm. longa, carnosa, cucullata, marginibus plus minusve papillosis. *Antherae* vix e perianthii tubo exsertae, 0.25 mm. longae. *Stylus* robustus, brevissimus. *Fructus* oblongo-ellipsoideus, perianthio persistente coronatus, 4 mm. longus, 2.5 mm. diametro, prominenter 10-costatus, inter costas reticulatus et saepe leviter glaucus.

British Kaffraria, *Cooper* 138! Transvaal; near Wonderfontein Railway Station, 1835 m., *Bolus* 12,278! Griqualand East; Mt. Currie, 1590 m., *Tyson* 1838! 1230! Tembuland; Tabasi, near Bazeia, 764 m., *Baur* 336 partly! Pondoland; Port St. John, Summit West Gate, 366 m., *Galpin* 3467! Natal; Port Shepstone, *Rogers*! Alexandria District; Dumisia, 600 m., *Rudatis* 472! Malvern, near Durban, 150–180 m., *Medley Wood* 4971! near Newcastle, 900–1200 m., *Medley Wood* 7186! Inanda, 540 m., *Medley Wood* 154! 249! without locality, *Mrs. Saunders*!

**T. fruticosum**, A. W. Hill; species fruticosa, foliis paucis, perianthii segmentis margine papillosis, sinubus inter segmentis latis distincta.

*Frutex* 1–1.75 m. altus; caulis teres, cortice transverse rupto-obtectus, basi usque ad 2 cm. crassus, inferne simplex, superne 4–6-ramosus, ramis 2-vel 3-divisis; ramuli ascendentes, leviter angulati vel compressi, glabri. *Folia* mox decidua, lineari-oblonga, obtusa, recurvata, 6–9 mm. longa vel interdum ad 2 cm. longa, carnosa, infra convexa, supra plana vel concava, glabra. *Cymulae* 1–3-florae, in racemos spiciformes laxos dispositae. *Bractee* floribus breviores, a pedunculo brevissimo plus minusve liberae, usque ad 5 mm. longae, subcrassae, cymbiformes, obtusae; bracteolae 2, floribus dimidio breviores, lineari-lanceolatae, acutae. *Perianthium* latum, cupulare, disco conspicuo instructum, 2 mm. longum, inter segmenta sinubus latis; segmenta late triangularia, 1 mm. longa, leviter cucullata, apice marginibusque papillosa. *Antherae* rotundatae, in perianthii tubo inclusae, 0.5 mm. longae. *Stylus* 0.25 mm. longus. *Fructus* ellipsoideo-globosus, basi contractus, perianthio persistente 6 mm. longus, basi prominenter 5-costatus, inter costas minus prominenter costatus et reticulatus.

Uitenhage Div.; Zuurberg Mts., Oct., *Mrs. Paterson* 35! Albany Div.; Howison's Poort Hills, Grahamstown, 660 m., *Galpin* 2900! Mountain slopes facing the sea, *MacOwan* 2094! in hills near Grahamstown, *Bolus* 1558! Featherstone Kloof, 610 m., *Schönland* 567! without precise locality, *Atherstone* 58! *Cooper* 56! Queenstown, *Cooper* 3045!



**T. glaucescens**, A. W. Hill; species inter species floribus in capitulis exiguis instructis et praecipue *T. repando*, A. W. Hill. affinis, sed ramis subaphyllis, foliis minutis, antheris e perianthii tubo exsertis distinguenda.

*Fruticosus*; rami 0.25–0.6 m. longi, diffusi, roseo-glauci, glabri; ramuli divaricati, fere aphylli, subteretes. *Folia* minima et pauca, linearia, obtusa, 1.5–3 mm. longa, rigida, glabra. *Flores* pauci, ad ramulorum apices in glomerulos narvos dispositi. *Bractee* inconspicuae, floribus multo breviores, lanceolatae, sub-acutae, supra concavae, glabrae; bracteolae minimae. *Perianthium* cylindricum, 1.5 mm. longum; segmenta lanceolata, sub-obtusa, 1.35 mm. longa, apice pilis longis barbata. *Antherae* e perianthii tubo exsertae, 0.75 mm. longae. *Stylus* 0.5 mm. longus, ultra antherarum apices attingens. *Fructus* ovoideus, 4 mm. longus, crasse 10-costatus, inter costas glaucus et tenuiter reticulatus.

Swellendam Div.; Zondereinde River, in dry plains, Jan., Burchell 7513!

**T. glomeratum**, A. W. Hill; species *T. pubescente*, A. DC., similis, sed omnino glabra, foliis subsparsis distincta.

*Caules* ascendentes, graciles, parce ramosi, paululum scabridopuberuli; rami graciles, sulcati, glabri vel fere glabri. *Folia* linearia, acuta, supra plana vel concava, infra interdum carinata, 6–8 mm. longa, glabra vel marginibus leviter scabrida. *Flores* in racemos brevissimos vel capitulos parvos dispositi. *Bractee* ovato-lanceolatae, acutae, floribus subaequales, carinatae, marginibus minutissime ciliatis; bracteolae bracteis triente breviores, eis angustiores sed ceterum similes. *Perianthium* 3–3.5 mm. longum; segmenta 1 mm. longa, lineari-lanceolata, acuta, apice dense barbata. *Antherae* in perianthii tubo inclusae, 1.5 mm. longae. *Stylus* 1.5 mm. longus, fere ad antherarum apices attingens. *Fructus* oblongus, circiter 6 mm. longus, in sicco virescens, basi praesertim subconspicue 5-costatus, costis intermediis inconspicuis.

George Div.; George district, Nov., Bolus 2458! Uniondale Div.; Long Kloof, 90 m., Aug., Schlechter 8399!

**T. gracilarioides**, A. W. Hill; species dense foliosa, bracteis elongatis, perianthii glandulis conspicuis, stigma subsessile distincta.

*Caules* e basi ramosi, usque ad 30 cm. alti; rami subdense foliati, ascendentes, angulati, glabri. *Folia* lineari-acicularia, acuta, 0.6–1.3 cm. longa, circiter 0.75 mm. crassa, dorso carinata, glabra, supra costa subprominente. *Flores* in cymulas racemosas foliosas terminales dispositi. *Bractee* pedunculo adnatae, foliis similes, marginibus angustis subtranslucentibus, floribus duplo longiores; bracteolae flores aequantes vel eis paullo longiores. *Perianthium* urceolatum, glandulis prominentibus instructum, circiter 2 mm. longum; segmenta lineari-lanceolata, subacuta, cucullata, 1.25–1.5 mm. longa, apice pilis paucis barbata, marginibus incurvis. *Antherae* ad segmentorum basin vel fere in tubo insertae, 0.25–

0.35 mm. longae. *Stigma* sessile vel subsessile. *Fructus* ovoides, 4.5 mm. longus, tenuiter 10-costatus, inter costas manifeste reticulatus.

Transvaal; grassy mountain sides of Saddleback Range, Barberton, 1200-1500 m., *Galpin* 543! Swaziland; Havelock Concession, 1100 m., *Saltmarsh in Herb. Galpin* 1848!

**T. gypsophiloides**, A. W. Hill; species nulli arete affinis ex affinitate *T. floribundo*, A. W. Hill, sed habitu gracile laxepatulo, foliis late linearibus vel lineari-lanceolatis, inflorescentiis paucifloribus laxepaniculatis, perianthiis urceolatis distincta.

*Caules* satis graciles, interdum copiose ramosi, tenuiter costati, glabri; rami graciles, patuli. *Folia* lineari-lanceolata vel late linearia, acutissima, 0.6-2.5 cm. longa, usque ad 3 mm. lata vel interdum angustissima, plana, prominenter 1-nervia, margine minute serrulata, glabra. *Flores* pauci, ad ramulorum apices dispositi; bracteae foliosae, pedunculo dimidium adnatae, carinatae; bracteolae flores aequantes vel eis breviores, acutae. *Perianthium* urceolatum, inferne dilatatum, 1.75 mm. longum; segmenta ovata, subacuta, 1.75 mm. longa, apice dense barbata. *Antherae* e perianthii tubo semiexsertae, in recessibus convexis subpendulae, 0.4 mm. longae. *Stylus* 0.25 mm. longus, interdum ad antherarum apices attingens. *Fructus* oblongo-ellipsoideus, 6 mm. longus, 10-costatus, inter costas valde reticulatus.

Natal; Umtwalumi, *Medley Wood* 573! 3105! near Verulam, *Medley Wood* 756! without precise locality, *Gerrard* 407! Transvaal; Queen's River valley, near Barberton, 550 m., *Galpin* 758!

**T. helichrysoides**, A. W. Hill; species *T. fallacci*, Schlechter, affinis, sed floribus in corymbis densos aggregatis, bracteis flavo-viridibus marginibus inconspicuis praecipue differt.

*Caules* elongati, usque ad 60 cm. longi, superne parce ramosi, virides, angulis angustis purpureis, glabri; rami suberecti. *Folia* linearia, subacuta, 1.3-4 cm. longa, fere 2 mm. lata, crassa et carnosa, supra plana vel leviter concava, glabra, marginibus anguste cartilagineis, sicco verrucosa. *Flores* in corymbos terminales subdensos dispositi. *Bractae* sicco flavo-virides, lanceolatae vel oblongo-lanceolatae, subacutae, pedunculo breviter adnatae, ad floris apicem attingentes, glabrae et subcarnosae; bracteolae bracteis paullo breviores, ceterum eis similes. *Perianthium* 2.5 mm. longum, glandulis externis conspicuis instructum; segmenta lanceolata, obtusa, 1.75-2 mm. longa, profunde cucullata, apice dense barbata, marginibus incurvis papillosis. *Antherae* in perianthii tubo inclusae, 0.25 mm. longae. *Stigma* subsessile. *Fructus* breviter stipitatus, ellipsoideus, 6 mm. longus, prominenter 5-costatus et minus prominenter 5-costatus, inter costas tenuiter reticulatus, sicco flavo-viridis.

Riversdale Div.; between Garcia's Pass and Muis Kraal, Oct., 600 m., *Bolus* 11,375!

**T. hispidulum**, Lam., var. **subglabra**, A. W. Hill, varietas a speciei minutissime hirsuta, perianthio et antheris majoribus, glandulis conspicuis praecipue differt.

*T. conostylum*, Schlechter in Engl. Bot. Jahrb. XVII. (1899), p. 117.

Clanwilliam Div.; Blauwberg, 367 m., *Schlechter* 8451! near Clanwilliam, in stony clefts of the hills, 245 m., *Leipoldt*, 500!

**T. hirsutum**, A. W. Hill; species *T. virenti*, E. Mey., affinis, sed omnino subdense puberula, stylo elongato, perianthii tubo elongato, ramis brevibus erectis distincta.

*Rhizoma* subgracile, ramosum; caules satis numerosi, subsimplices, erecti, leviter angulati, subdense puberuli. *Folia* linearia, apice acutissima et cartilaginea, plana, 0.6-1.2 cm. longa, 1-nervia, carnosae, marginibus scabrido-puberula. *Flores* in racemos bracteatos dispositi, in bractearum axillis solitarii; pedunculi 1-2.5 mm. longi; bracteae ad pedunculi apicem adnatae, plerumque bracteis multo longiores sed interdum eis aequales, foliosae, costa media et marginibus puberulae; bracteolae floribus plerumque leviter longiores, bracteis similes. *Perianthium* circiter 3 mm. longum, glandulis conspicuis externis instructum; segmenta 2 mm. longa, cucullata, glabra. *Antherae* 0.75 mm. longae. *Stylus* 1.5-2 mm. longus, supra antherarum apices attingens. *Fructus* late ellipsoideus, perianthio persistente 6 mm. longus, circiter 10-costatus, inter costas prominenter reticulatus.

Queenstown Div.; plains near Queenstown, 1100 m., *Galpin* 1585! Graaff Reinet Div.; near Graaff Reinet, Cave Mt., 1300 m., *Bolus* 525! Orange River Colony; Leeuw Spruit and Vrede Fort, *Barrett Hamilton* in *Herb. Mus. Brit.*! Transvaal; Heidelberg, Grootvlei Farm, *Gilfillan* 244 in *Herb. Galpin*!

The elongated perianth tube and style reaching to above the top of the anthers are shown in fig. 1 and should be compared with the similar figure (fig. 4) of *T. virens*, E. Mey.

**T. hystricoides**, A. W. Hill; species ramulis rigidis spinescentibus puberulis, fructibus costatis puberulis vix reticulatis valde distincta.

*Frutex* rigidus multo ramosus, ramulis rigidis spinescentibus basi contractis longitudinaliter rugosis minute puberulis. *Folia* minima, triangularia, rigide coriacea, acuta, extra paulum puberula. *Flores* solitarii, in bracteis distincte pedicellati. *Bracteae* ovatae, subacutae, glabrae; bracteolae minutae. *Receptaculum* tenuiter pubescens, costatum. *Perianthium* fere 2 mm. longum; segmenta ovata, obtusa, 1.5 mm. longa, apice et marginibus pilis satis longis barbata. *Antherae* e perianthii tubo exsertae, 0.5 mm. longae. *Stylus* crassus, 0.5 mm. longus, circiter ad antherarum medium attingens, stigmatibus subcapitato. *Fructus* ovoideo-globosus, stipitatus, circiter 4 mm. longus, valide 10-costatus, breviter puberulus, inter costas vix reticulatus.

Griqualand West; between Griqua Town and Spuigslang, *Burchell* 1699!

**T. Hystrix**, A. W. Hill; species habitu *T. rigido*, Sond., similis, sed foliis squamaeformibus, perianthii segmentis fimbriatis facile distinguenda.

*Fruticosus* rigidus multo ramosus; ramuli spinescentes, interdum flexuosi, basi contracti, sicco crasse et crebre longitudinaliter rugosi vel sulcati, glabri. *Folia* parva, plus minusve triangularia, crassa et coriacea, leviter mucronata, glabra. *Flores* solitarii, in bracteis sessiles. *Bractee* minimae, late ovatae, leviter mucronatae, glabrae; bracteolae minutae. *Receptaculum* glabrum. *Perianthium* 1.5 mm. longum; segmenta triangulari-ovata, cucullata, 0.75 mm. longa, apice et marginibus pilis satis longis barbata. *Antherae* e perianthii tubo exsertae, 0.5 mm. longae; filamenta antheras subaequantes. *Stylus* brevis, ad antherarum basin attingens, 0.25 mm. longus. *Fructus* ovoideo-globosus, fere 4 mm. longus, valide 10-costatus, crasse 10-costatus, inter costas glaucus.

Graaff Reinnet Div.; near Graaff Reinnet, 750 m., *Bolus* 523! Middleburg Div.; Conway Farm, 1000 m., *Gilfillan* 5503! Bechuanaland; Alexandersfontein, 1230 m., *Galpin* 7000!

The fimbriated edges of the perianth segments mark off this species, *T. hystricoides* and *T. horridum*, from all others (see fig. 7). *T. Hystrix* has been confused with *T. rigidum*, Sond., which in turn was merged by De Candolle in *T. lineatum*, but it proves to be distinct and will be so retained in the *Flora Capensis*.

***T. impeditum***, A. W. Hill; species *T. phyllostachyo*, Sond., affinis, foliis apice recurvatis, antheris e perianthii tubo exsertis, stylo distincto distinguenda.

*Caules* e rhizomate caespitosi, graciles, simplices vel parce ramosi, leviter angulosi, glabri. *Folia* linearia, apicibus recurvatis acutis, 0.4-1.4 cm. longa, plana, crassiuscula, glabra. *Flores* in spicas laxas dispositi, in bractee quaeque axilla solitarii. *Bractee* pedunculo leviter adnatae vel liberae, lineares, apice acutae et recurvatae, flores aequantes vel eis paulum longiores, supra planae, glabrae; bracteolae floribus dimidio breviores, bracteis similes. *Perianthium* 2-3 mm. longum; segmenta, anguste lanceolata, subacuta, 1.5-2 mm. longa, apice dense barbata. *Antherae* circiter 0.5 mm. longae, e perianthii tubo exsertae. *Stylus* 0.5 mm. longus, circiter antherarum basin attingens. *Fructus* ellipsoideo-globosus, 4.5 mm. longus, prominenter 10-costatus, purpureus, inter costas conspicue reticulatus. *T. Sonderianum*, Schlechter in Journ. Bot. 1898, 376 partim, quoad *Bolus* 526 partim.

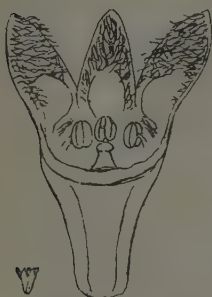
Queenstown Div.; Kopje near Queenstown, 1000 m., *Galpin* 2157 partly in Herb. Kew! *Galpin* 1545! Hangklip, 1680 m., *Galpin* 5856! *Mund and Maire*! *Kolbe*! Graaff Reinnet Div.; Sneeuwberg Mts. near Graaff Reinnet, 1580 m., *Bolus* 526 partly! Orange River Colony; Bester's Vlei near Witzie's Hoek, 1620 m., *Bolus* 8249! Natal; near Durban, 900-1200 m., *Sutherland*! mts. above Estcourt, 1500 m., *Schlechter* 3357!

var. *rasa*, A. W. Hill; a typo perianthii segmentis pilis paucis brevibus barbatis differt.

Transvaal; Wonderboompoort, Pretoria, *Rehmann* 4544! Zuikerbosch Rand, 1700 m., *Schlechter* 3507!



**T. junceum**, Bernh., var. **mammosa**, A. W. Hill; a typo gibba carnosula magna intra perianthii segmenta instructum differt.



Port Elizabeth Div.; near Port Elizabeth, Walmer, Mrs. Paterson 806!

This plant is remarkable for the white, egg-shaped protuberances on the inner faces of the perianth segments. The branches are rather weak and flexible, but plant in vegetative character agrees generally with *T. junceum*.

**T. junceum**, Bernh., var. **plantaginea**, A. W. Hill, a typo spicis densis more *Plantago* distincta.

Transkei; Kentani, 305 m., Pegler 878 partly; near Zolora Mouth, Pegler 1302.

**T. Junodi**, A. W. Hill; species speciebus floribus in racemos simplices dispositis affinis, sed habitu tenue foliis anguste linearibus curvatis, glandulis externis conspicuis distinguenda.

*Caules* e basi ramosi; rami ascendentes, graciles, acute angulati vel fere alati, inter angulos sulcati, glabri. *Folia* linearia, acutissima, 0.6-1.3 cm. longa, infra carinata, supra subplana et prominenter 1-nervia, glabra. *Flores* solitarii, in bractea et bracteolarum duarum axim subsessiles; bractea pedunculo brevissimo paulum adnata, foliis similis; bracteolae florem circiter aequantes, anguste lineares, acutae. *Perianthium* 2.75 mm. longum, glandulis externis conspicuis instructum; segmenta lanceolata, subacuta, 1.75 mm. longa, cucullata, apice barbata. *Antherae* e perianthii tubo exsertae, 0.65 mm. longae. *Stylus* 1.5-1.75 mm. longus, ad antherarum medium vel apicem attingens. *Fructus* elongato-ellipsoideus, perianthio persistente circiter 5 mm. longus, subconspicue costatus et reticulatus.

South Africa. Transvaal; Shilouvane, Junod 1301! (Herb. Boiss. and Herb. Zurich) without precise locality, Wahlberg! (Herb. Mus. Stockh.).

**T. lacinulatum**, A. W. Hill in Ann. Bolus Herb. ined.; species *T. rigido*, Sonder, quoad habitum similis ramis et floribus minute puberulis segmentis perianthii lacinulatis distincta.

Namāqualand. Great Karasberg, H. H. W. Pearson 7805!

The full description of this interesting plant collected by Prof. Pearson on his recent journey to the Great Karasberg, etc., under the auspices of the Percy Sladen Trust, will be published in the Annals of the Bolus Herbarium along with the descriptions of other plants collected during the expedition. The clothing of minute hairs over the whole plant including the outside of the perianth segments and the receptacle covering the ovary distinguishes this spinous species from all its allies. It is further peculiar and unique in having a large membranous flap or lacinula on either margin of the perianth segments in addition to and

distinct from the apical hood. The structure of the flower is well seen in fig. 5.

**T. macrogyne**, A. W. Hill; species inflorescentiis racemosis simplicibus, floribus speciosis, stylis supra antherarum apices elongatis, glandulis absentibus distinguenda.

*Caules* brevissimi, usque ad 13 cm. longi, simplices vel furcati, probabiliter e rhizomate orti, graciles, sulcati vel angulares, glabri. *Folia* linearia, apice cartilaginea, acuta, 0.8–1.1 cm. longa, circiter 1 mm. lata, infra leviter carinata, subcrassa et carnosae, glabra. *Flores* pauci, solitarii, axillares, breviter pedunculati. *Bractee* ad pedunculi apicem adnatae, lineares, apice acute subulatae, flores aequantes vel eis paullo longiores, supra profunde concavae, marginibus minutissime serrulatae; bracteolae flores aequantes, bracteis angustiores. *Perianthium* album, 4 mm. longum glandulis non visis; segmenta oblongo-lanceolata, obtusa, 2 mm. longa, cucullata, plana, dense lanato-barbata. *Antherae* vix e perianthii tubo exsertae, fere 1 mm. longae. *Stylus* 2.25 mm. longus, antheris superans.

Orange Free State; Bethlehem, low lying veld, Oct., Major A. J. Richardson!

**T. microcephalum**, A. W. Hill; species *T. pycnantho*, Schltr., affinis, habitu et foliis imbricatis appressis obtusis facile distinguenda.

*Rami* subteretes, glabri; ramuli breves. *Folia* satis dense disposita, anguste lanceolata, subacuta, 2.25–4 mm. longa, circiter 1 mm. lata, crassa carnosaque, infra rotundata, supra plana vel concava, glabra. *Flores* pauci, in glomerulos terminales satis densos dispositi. *Bractee* floribus breviores, rubescentes, foliis similes, carnosae, marginibus inferne tenuiter fimbriatis, glabrae; bracteolae bractee fere aequantes et leviter carinatae. *Perianthium* circiter 2.5 mm. longum; segmenta lanceolata, obtusa, 1.25 mm. longa, extra rubescentia, cucullata, apice barbata, marginibus pubescentibus. *Antherae* e perianthii tubo exsertae, 0.5 mm. longae. *Stylus* 0.5 mm. longus, supra antherarum basin attingens, stigmatē capitato. *Fructus* oblongo-ovoideus, 4 mm. longus, prominenter 10-costatus, inter costas crasse reticulatus.

Worcester Div.; Matroos, 2000 m., Dec., Marloth 2252! (in Herb. Bolus not in Herb. Marloth).

**T. Nationae**, A. W. Hill; species *T. racemoso*, Bernh., affinis, caulibus elongatis, foliis majoribus praecipue differt.

*Caulis* gracilis, subsimplex, ut videtur e rhizomate ortus, circiter 30 cm. altus, leviter flexuosus, costatus, glaber. *Folia* linearia, apice breviter acuto cartilagineo, 1–2.5 mm. longa, circiter 1 mm. lata, plana, carnosae, supra costa conspicua, glabra. *Flores* albi, pauci, in cymas 1-floras brevissime pedunculatas racemose-dispositas dispositi, intra bractee breviter stipitati. *Bractee* pedunculo breviter adnatae, floribus multo longiores, plana et foliis persimiles; bracteolae floribus aequilongae vel paulum longiores, virides et bracteis similes sed angustiores. *Perianthium* 3–5 mm. longum; segmenta triangulari-elliptica,

1.25 mm. longa, cucullata, marginibus papillosis sed apice non barbata. *Antherae* e perianthii tubo semiexsertae, 0.75 mm. longae. *Stylus* 1.5–3 mm. longus, supra antherarum bases attingens.

Transvaal; Rustenburg, 1300 m., Dec., *Nation* 266!

This species is named in honour of Miss Olive Nation who has added considerably to our knowledge of the flora of the Transvaal.

**T. nigrum**, A. W. Hill; species *T. coriario*, A. W. Hill, affinis, bracteis lanceolatis acutis, perianthiis minoribus segmentis conspicue cucullatis praecipue differt.

*Caules* e rhizomate lato lignoso orti, prominenter costati et sulcati, glabri. *Folia* late linearia, acuta, recta, 1.3–2 cm. longa, plana, crassa et carnosa, sicco nigra, glabra. *Flores* in bracteis solitarii, subsessiles, in spicas laxas dispositi. *Bracteae* florem aequantes vel eis longiores, lineari-lanceolatae, acutae, integrae, glabrae; bracteolae bracteis paullo breviores. *Perianthium* glandulis externis magnis instructum, circiter 3 mm. longum; segmenta lineari-lanceolata, subacuta, 2 mm. longa, incurva et profunde cucullata, ad basin dense fimbriata et barbata. *Antherae* tubi apicem versus inclusae, 0.5 mm. longae. *Stylus* 1 mm. longus, ad antherarum apicem vel medium attingens. *Fructus* ovoideo-ellipsoideus, 7–8 mm. longus, prominenter 10-costatus, inter costas leviter reticulatus.

Orange River Colony, *Cooper* 826! 1061! Natal; between Pietermaritzberg and Greytown, *Wilms* 2253! Giant's Castle, 2745 m., *Guthrie* 4954! East Griqualand; near Kokstad, 1535 m., *Tyson* 1863!

**T. nudicaule**, A. W. Hill; species ramis subnudis singulis ex affinitate *T. stricti*, Berg., foliis squamiformibus, perianthii segmentis marginibus tenuiter ciliatis reflexis distinguenda.

*Frutex* divaricato-ramosus, efoliatus vel fere efoliatus; rami subteretes, circiter 2 mm. crassi, glabri. *Folia* superiora (vel bracteae?) bractiformia, ovato-triangularia, acute acuminata, circiter 1.5 mm. longa et lata, squamiformia, apicibus nigrescentibus, marginibus fimbriato-ciliatis, ceterum glabra. *Bracteae* foliis squamiformibus similes; bracteolae plus minusve lanceolatae, acutae, floribus circiter dimidio breviores, marginibus angustissime membranaceis minute serrulatis. *Perianthium* 2 mm. longum, glandulis conspicuis carnosus externis et disco interno instructum; segmenta triangulari-ovata, cucullata, 1.5 mm. longa, marginibus tenuiter ciliatis reflexis. *Antherae* e perianthii tubo exsertae, 0.4 mm. longae. *Stylus* 0.5 mm. longus, ad antherarum medium attingens. *Fructus* stipitatus, ellipsoideo-globosus, stipite 2 mm. longo, fere 6 mm. longus, prominenter 10-costatus, inter costas crasse reticulatus.

Clanwillian Div.; Olifant River, 150 m., Sept., *Schlechter* 8479! Malmesbury Div.; near Hopefield, Sept., *Bachmann* 15!

**T. occidentale**, A. W. Hill; species ex affinitate *T. stricti*, Berg., perianthiis majoribus segmentorum papillis marginalibus conspicuis, antheris et stylis longioribus distinguenda.

*Rami* elongati, leviter-angulati, sparse foliosi, glabri. *Folia* superiora ad caulem adpressa, linearia, acuta vel subacuta, 4-8 mm. longa, circiter 1 mm. crassa, carnosa, supra plana vel leviter concava, glabra. *Flores* in corymbos laxos terminales circiter 2 cm. diametro dispositi. *Bracteae* floribus multo breviores, lineari-lanceolatae, subacutae, circiter 3 mm. longae, leviter carinatae, glabrae; bracteolae lanceolatae vel ovato-lanceolatae, bracteis dimidio breviores. *Perianthium* 3-5 mm. longum; segmenta late triangulari-ovata, obtusa vel subacuta, 2 mm. longa, ebarbata, marginibus papillis conspicuis dense induta. *Antherae* e perianthii tubo exsertae, 0.8 mm. longae. *Stylus* 1 mm. longus, fere ad antherarum bases attingens. *Fructus* non visus.

Little Namaqualand; Modderfontein, Whitehead!

**T. orientale**, A. W. Hill; species *T. Burkei*, A. W. Hill, et *T. macrogyne*, A. W. Hill, affinis, ab illa perianthiis magnis, ab hac glandulis externis conspicuis praecipue differt.

*Caules* pauci, e rhizomate lignoso satis robusto orti, suberecti, angulares et sulcati, glabri; rami suberecti, parce foliosi. *Folia* linearia, acuta vel subacuta, 0.6-1.5 cm. longa, 1-1.5 mm. lata, crassa et carnosa, marginibus cartilagineis scabridulis, interdum costa media distincta vel infra plus minusve carinata, glabra. *Flores* pauci, in racemos foliatis dispositi, in bractearum axillis solitarii. *Bracteae* pedunculo adnatae, lanceolatae vel ovato-lanceolatae, acute acuminatae, floribus longiores, marginibus cartilagineis scabridulis; bracteolae bracteis similes sed eis dimidio breviores. *Perianthium* urceolatum, circiter 4 mm. longum, glandulis externis instructum; segmenta lineari-lanceolata, obtusa, 2-3 mm. longa, cucullata, apice dense lanato-barbata. *Antherae* vix e perianthii tubo exsertae, circiter 1 mm. longae. *Stylus* 1.5 mm. longus, fere ad antherarum apices attingens. *Fructus* ovoideo-ellipsoideus, 6 mm. longus, conspicue 10-costatus, inter costas leviter reticulatus.

Stockenstrom Div.; Katberg, Hutton! Basutoland, Cooper 3094! Tembuland; Tabase, near Baziya, 764 m., Nov., Baur 336 in part! East Griqualand; near Kokstad, 1300 m., Oct., Tyson 3157!

**T. Patersonae**, A. W. Hill; species sectionis *Annulatae* floribus in capitula spicata dispositis *T. Frisae*, L., et *T. subnudo*, Sond., affinis, ab illa capitulis compactis bractearum marginibus integris, ab hac barbae capillis lanigeris praecipue differt.

*Caulis* circiter 22 cm. altus, e basi parce ramosus, leviter sulcatus, glaber; ramuli ascendentes. *Folia* linearia, acuta, subteretia vel supra subplana, 0.4-1.4 cm. longa, crassa, glabra. *Inflorescentia* e cymulis 3-5-floris in spicas circiter 1 cm. longas ovoideus terminales densas dispositis constituta. *Bracteae* lineari-lanceolatae, acutae, floribus breviores, sicco virides, glabrae, marginibus angustis membranaceis integris; bracteolae bracteis multo breviores. *Perianthium* urceolatum, 2.5 mm. longum, glandulis externis conspicuis et intra faucem pilis instructum; segmenta lanceolata, subacuta, 1.5 mm. longa, apice dense lanato-barbata,



marginibus papillosis. *Antherae* e perianthii tubo subexsertae, 0.5 mm. longae. *Stigma* sessile. *Fructus* non visus.

Port Elizabeth Div.; Walmer, *Mrs. Paterson* 682! 792!

**T. patulum**, A. W. Hill; species ex affinitate *T. funalis*, L., et *T. macrostachyi*, A.DC., sed ramis numerosis rigidis patulis, floribus stylo conspicuo instructis praecipue differt.

*Caules* divaricate ramosi, erecti, glabri; rami graciles, elongati, recti, a caule subangulo 45° abeuntes. *Folia* inferiora acicularia, acuta, 0.7–1 cm. longa, gracillima, dorso vel margine interdum dentata, ceterum glabra; superiora ramis subtendentia et leviter adnata, recurvata, linearia vel lineari-lanceolata, subacuta, usque ad 4 mm. longa, glabra. *Flores* in spicas elongatas flexuosas laxae dispositi, in bractearum axillis solitarii vel 3-nati. *Bractee* floribus multo breviores, lanceolatae, subacutae, carnosae, circiter 2 mm. longae, glabrae; bracteolae bracteis paullo breviores sed eis ceterum similes. *Perianthium* 2–3.5 mm. longum, glandulis conspicuis externis instructum; segmenta lanceolata, subacuta, 2–2.5 mm. longa, marginibus et apice pilis robustis longis barbata, intra faucem pilorum annulo instructa. *Antherae* e perianthii tubo exsertae, 0.75 mm. longae; filamenta antheris aequilonga. *Stylus* robustus, 0.5 mm. longus. *Fructus* basi turbinatus, subglobofus, 6.5 mm. longus, satis prominenter 10-costatus, inter costas delicate reticulatus. *T. funale*, L. var. *caledonicum*, Sond. in Flora 1857, 359; A.DC. in DC. Prodr. xiv. 668.

Malmesbury Div.; near Mooresberg, 140 m., *Bolus* 9981! Zwartland and region of Berg River streams, *Ecklon and Zeyher* 51 in herb. Berol. et Stockh.! Paarl Div.; near Paarl, 85 m., *Schlechter* 9207! Cape Div.; Devil's Peak, *Bergius*! South Africa; without definite locality, *Harvey* 711 partly!

The perianth in this species is large and with conspicuous external glands. The ring of golden-brown throat hairs is well developed and the base of the perianth is glandular and disc-like (see fig. 14).

**T. penicillatum**, A. W. Hill; species a speciebus alteris pilorum discretorum penicillo pone antheras sito et ab eis distincto distinguenda.

*Caules* erecti, longitudinaliter sulcati, robusti, lignosi, glabri. superne ramosi; rami erecti, subcorymbosi. *Folia* linearia, acute mucronata, 2.5–3 cm. longa, circiter 2 mm. lata, infra carinata, glabra, sicco rugosa. *Flores* in corymbos densos terminales usque ad 2.5 cm. diametro dispositi. *Bractee* purpurascens, lineari-oblongae, subacutae, carinatae, flores aequantes, ad 2 mm. latae, marginibus subtranslucentibus; bracteolae bracteis paullo breviores. *Perianthium* 2.25 mm. longum; segmenta lineari-lanceolata, subacuta, circiter 2.25 mm. longa, plana, cucullata, apice et marginibus pilis longis instructa. *Antherae* 0.25 mm. longae, in perianthii tubo inclusae, pilorum discretorum penicillo pone antheras sito et ab eis distincto. *Stylus* 0.25 mm. longus vel subnullus. *Fructus* robuste et breviter stipitatus, ellipsoideus, 6 mm. longus, subprominenter 5-costatus, nervis intermediis inconspicuis, inter nervos transverse reticulatus.

George Div.; Cradock Berg, 760 m., *Galpin* 4546; Humansdorp Div.; Storms river, 80 m., *Schlechter* 5986.

This species is the sole representative so far observed of the newly-constituted section *Penicillata*. The hairs behind the anthers are quite free, forming a loose pencil and are not attached to the anthers in any way (see fig. 13).

**T. pleuroloma**, A. W. Hill; species ramis prostratis, ramulis flexibilibus, perianthii segmentis lacinulis instructis nulli arcte affinis.

*Herba* vel suffrutex perennis, glabra, ramis prostratis elongatis sulcato-striatis circiter 20–40 cm. longis, ramulis elongatis flexibilibus. *Folia* sparsa, acicularia, 3–5 mm. longa, abrupte acuta. *Flores* in bractearum axillis solitarii, pedicellati, in inflorescentias laxae racemosas dispositi. Bracteae subulatae, floribus breviores, 1.5–2 mm. longae, acute acuminatae, glabrae; bracteolae minutae. *Perianthium* 1.5 mm. longum, glandulis externis conspicuis; segmenta 0.75 mm. longa, ovata, cucullata, glabra, marginibus lacinulis membranaceis inflexis instructa. *Antherae* 0.5 mm. longae, e perianthii tubo exsertae, lacinulis tutatae. *Stylus* 0.5 mm. longus, ad antherarum basin attingens. *Fructus* ignotus.

Murraysburg Div.; near Murraysburg, W. Tyson 129 in Herb. Bolus! Carnarvon Div.; Karrebergen, *Burchell* 1566!

**T. polygaloides**, A. W. Hill; species floribus in racemos elongatos dispositis, ex affinitate *T. magalismontani*, Sond., bracteis flores aequantibus, stigma sessile praecipue differt.

*Radix* ut videtur annua, brevis, lateralibus longioribus patulis stramineis; caulis gracilis, superne ramosus, parce foliatus, subconspicue longitudinaliter costatus, glaber; rami erecti, graciles. *Folia* gracilia, linearia, acuta, 0.8–1.3 cm. longa, sicco nigra, glabra. *Flores* in cymulas 1-floras racemosas breves dispositi; cymulae breviter pedunculatae, foliis parvis 1–2 et bracteis 3 florem circumdatis. Bracteae lineares, florem aequantes; bracteolae acutae. *Perianthium* 1.5 mm. longum; segmenta elliptico-lanceolata, subacuta, 1–1.5 mm. longa, apice barbata et marginibus pubescentibus. *Antherae* 0.5 mm. longae, e basi segmentorum subexsertae. *Stigma* subsessile. *Fructus* ovoideus, 5 mm. longus, rubro-glaucus, subprominente 10-costatus et reticulatus.

Natal; Inanda, Clairmont, Oct., J. M. Wood 1095! in marsh near Clairmont, July, *Schlechter* 2976!

**T. prostratum**, A. W. Hill; inter species floribus in capitula exigua dispositis *T. selagineo*, A. DC., affinis, habitu prostrato et foliis acicularibus ascendentibus facile distinguenda.

*Caules* numerosi, e rhizomate erecto gracile prostrati, glabri, teretes; ramuli ascendentes, gracillimi, parce foliosi. *Folia* acicularia, subacuta, teretia, 0.8–1.25 cm. longa, carnosa, glabra. *Flores* ad ramulorum apices glomerati. Bracteae flores aequantes vel eis longiores, lineares vel lineari-lanceolatae, subacutae, glabrae. *Perianthium* circiter 1 mm. longum; segmenta triangularia, acuta, fere 1 mm. longa, apice marginibusque papillis

barbata. *Antherae* e perianthii tubo exsertae, 0·3 mm. longae. *Stylus* fere 0·5 mm. longus, ad antherarum medium vel apicem attingens. *Fructus* ovoideo-globosus, 3·5 mm. longus, prominenter 10-costatus, inter costas delicate reticulatus.

Ceres Div.; Skurjdeberg Range near Gydouw, Jan., 1600 m., *Schlechter* 10,008!

**T. pungens**, A. W. Hill; species *T. spinoso*, Linn., affinis, sed foliis rigidis subulatis praecipue differt.

*Frutex* multi-ramosus circiter 6 dm. altus, ramis congestis glaucescentibus. *Folia* ramis ad perpendicularum affixa pungentia, rigide subulata, apice acutissime spinosa, 4-7 mm. longa, subteretia, glaucescentia. *Flores* solitarii, in bractearum axillos dispositi; bracteae foliis similes; bracteolae minutae, ad basin pedicelli affixae. *Perianthium* 1·5-1·75 mm. longum, glandulis conspicuis externis instructum; segmenta triangulari-ovata, 0·5-0·75 mm. longa, subcucullata, plana, marginibus lacinulis membranaceis instructa. *Antherae* e perianthii tubo exsertae, 0·25-0·5 mm. longae. *Discus* conspicuus. *Stylus* 0·5 mm. longus. *Fructus* ellipsoideo-globosus, circiter 2·5 mm. longus, costis 10 et reticulationibus inconspicuis instructus.—*T. spinosum*, Drège, in *Zwei Pflanzengeogr. Docum.* 226 quoad *T. spinosum*, Drège e, non Linn. f.

Little Namaqualand; between Pedroskloof and Lilyfontein, 920-1225 m., Drège—*T. spinosum* e, in Herb. Kew. et Herb. Berol.; Kamiesberg Range at Karkamo, among bushes, *Pearson* 6684.

There has been some confusion in affixing the specimens *Zeyher* 1504 and Drège e both at Stockholm, Kew and the British Museum to the sheets. It is not clear whether *T. pungens* and *T. spinosum* have both been collected at Heerelogeement or whether *T. spinosum* only is known from this locality. It would seem more probable that *T. pungens* is confined to Namaqualand.

**T. repandum**, A. W. Hill; inter species floribus in capitula exigua dispositis, *T. glaucescente*, A. W. Hill, affinis, foliis basalibus acicularibus antheris in perianthii tubo inclusis differt.

*Frutex* parvus, patulus, ramosus, circiter 15 cm. altus; radix erecta, gracilis, ramis longis horizontaliter patentibus pallide stramineis; caules patuli et ascendentes 3 vel 4, prominenter costati, glabri. *Folia* sparsa, recurvata, acicularia, acuta, 0·6-1 cm. longa, circiter 0·5 mm. crassa, glabra. *Flores* 3-4 ad ramulorum apices in glomerulos parvos dispositi, sessiles. *Bracteae* inconspicuae, floribus vix dimidio breviores, ovatae vel lanceolatae, acute acuminatae, marginibus plus minusve membranaceis, glabrae; bracteolae bracteis parte tertia breviores, ceterum eis persimiles. *Perianthium* 1·5-2 mm. longum; segmenta ovata, subacuta, plana, cucullata, 0·75 mm. longa, marginibus et apice pilis longis dense barbata. *Antherae* in perianthii tubo inclusae, paulum supra 0·5 mm. longae. *Stigma* subsessile vel stylo brevissimo. *Fructus* oblongo-globosus, basi constrictus et stipitatus, 3 mm. longus, subprominenter costatus, inter costas reticulatus, sicco rubro-brunneus.

Malmesbury Div.; neighbourhood of Hopefield, between Lilyfontein and Rondekui, Sept., *Bachmann* 2195!

*T. rufescens*, A. W. Hill; species *T. pubescens*, A. DC., affinis, foliis subsparsis, bracteis rufescentibus et floribus in spicas dispositis praecipue differt.

*Caules* rubro-brunnei, pergraciles, parce et divaricate ramosi, sulcati, pilis subreflexis breviter pubescentes; rami satis dense foliosi. *Folia* patula, linearia, acuta, 6-8 mm. longa, breviter pubescentia vel fere glabra. *Flores* in spicas densas oblongas terminales dispositi. *Bractae* rufescentes, lineari-lanceolatae, acute acuminatae, floribus subaequales vel eis paullo longiores, carinatae, extra pubescentes, marginibus submembranaceis pubescentibus; bracteolae bracteis similes sed paullo breviores. *Perianthium* extra minute pubescens, 1.75 mm. longum; segmenta triangularia, subacuta, vix 1 mm. longa, marginibus leviter incurvis, intra dense barbata. *Antherae* e perianthii tubo semiexsertae, 0.5 mm. longae. *Stylus* vix 1 mm. longus, fere ad antherarum apices attingens. *Fructus* ovoideus, 4 mm. longus, prominenter costatus, inter costas distincte reticulatus.

Riversdale Div.; in fields near Riversdale, 90 m., Nov., *Schlechter* 1851!

*T. Susannae*, A. W. Hill; species habitu *T. foliosi*, A. DC., sed inflorescentiis in cymulas axillares racemoso-dispositis, perianthii segmentis subglabris, stigma subsessile distincta.

*Caules* erecti, lignosi, angulis rubris, glabri; rami ascendentes vel suberecti. foliati. *Folia* lineari-acicularia, plus minusve trigona, acuta, 1-1.5 mm. longa, circiter 0.75 mm. crassa, glabra. *Inflorescentia* e cymulis 3-5 floris breviter pedunculatis vel subsessilibus in racemos foliosos terminales dispositis constituta: pedunculi 2-4 mm. longi. *Bractae* ad pedunculi apicem adnatae, floribus multo longiores, anguste lineari-lanceolatae, acutae vel subacutae, marginibus interdum subtranslucentibus et rufescentibus, infra convexae, supra concavae, glabrae, integrae; bracteolae quam bractearum pars libera dimidio breviores, ceterum eis similes. *Perianthium* 2-2.5 mm. longum, glandulis externis distinctis et intra disco lobato instructum; segmenta late triangulari-ovata, subacuta, 1 mm. longa, cucullata, carnosae, glabra, marginibus vix papillois. *Antherae* e perianthii tubo subexsertae, 0.25 mm. longae. *Stigma* subsessile. *Fructus* ellipsoideo-globosus, 5 mm. longus, prominenter 10-costatus, subcarnosus, inter costas vix reticulatus.

Riversdale Div.; Gysmans Hock, June, *Muir in Herb. Galpin* 359! 5327! South Africa; without precise locality, *Krebs* 150! 175! specimen without indication of the collector in *Herb. Kew*!

Named in honour of Mrs. Muir, who has greatly assisted Dr. Muir in adding to our knowledge of the South African flora.

*T. scirpioides*, A. W. Hill; species *T. natalense*, Sond., affinis, sed ramis rigidioribus robustioribus, foliis ovatis squamiformibus, bracteis late ovatis acutis praecipue differt.

*Caules* lignosi, e rhizomate polycephalo lignoso satis numerosi,



e basi vel superne ramosi, conspicue sulcati, glabri, efoliati. *Flores* in spicas laxas erectas laxae corymbosi. *Bractee* squamiformes, floribus multo breviores, late ovatae, acutae vel acute acuminatae, 1.5–2 mm. longae, carinatae, glabrae, marginibus brunneis anguste membranaceis; bracteolae bracteis similes sed eis paulum breviores. *Perianthium* 2.5 mm. longum; segmenta triangularia, acuta, plana, 1.5 mm. longa, apice dense lanato-barbata, marginibus pubescentibus. *Antherae* in perianthii tubo inclusae, 0.5 mm. longae. *Stigma* sessile vel subsessile. *Fructus* basi leviter contractus, ellipsoideo-globosus, 6 mm. longus. 2.75 mm. diametro, inconspicue 10-costatus, inter costas vix reticulatus.

Orange River Colony; Harrismith, 1650 m., Dec., *Sankey* 249! Besters Vlei, near Witzies Hoek, 1620 m., Dec., *Bolus* 8248! without precise locality, *Cooper* 834! Griqualand East; near Kokstad, 1290 m., Oct., *Tyson* 1535! Natal; Mooi river flat, 1200 m., Nov., *J. M. Wood* 4006!

**T. sertulariastrum**, A. W. Hill; species *T. euphrasioidei*, A. DC., affinis, caulibus minute puberulis floribus et fructibus minoribus praecipue differt.

*Herba* annua; caules multi-ramosi, subteretes, ramis congestis ascendentibus minute puberulis. *Folia* sparsa, inferiora acicularia, teretia, circiter 1–1.5 cm. longa, subobtusata, glabra; folia superiora subulato-lanceolata, glabra, apicibus nigrescentibus acutissimis 2 mm. longis. *Flores* 1–3 ad ramulorum apices dispositi, sessiles, bracteis bracteolisque linearibus vel ovato-lanceolatis acutissime acuminatis floribus brevioribus apicibus nigrescentibus marginibus submembranaceis fimbriatis circumdati. *Perianthium* ad basin globosum, 2 mm. longum, segmentis lineari-lanceolatis acutis 1.25 mm. longis apice cucullatis dense barbatis. *Antherae* in perianthii tubo inclusae, 0.4–0.5 mm. longae. *Stigma* subsessile. *Fructus* ellipsoideus, 1.5 mm. longus, costis 10 et reticulationibus distinctis.

Caledon Div.; Papies Vlei, *Schlechter* 10,448! Breadasdrorp Div.; Rietfontein, *Bolus* 8597.

**T. spartioides**, A. W. Hill; species gracillima junciformis ex affinitate *T. confinis*, Sond., inflorescentiis abbreviatis, stylo elongato distincta.

*Planta* circiter 13 cm. alta; rhizoma circiter 5 mm. crassum, ramis furcatis; caules ascendentes, gracillimi, teretes, simplices vel parce ramosi, glabri. *Folia* ad caulem arcte adpressa, subulato-lanceolata, acute acuminata, 2–3 mm. longa, dorso convexa, glabra. *Flores* ramorum axillarium apices versus subconferti, in bractearum axillis sessiles. *Bractee* squamatae, ovato-lanceolatae, acuminatae, marginibus minute fimbriatae, floribus circiter dimidio breviores; bracteolae bracteis similes sed angustiores. *Perianthium* 1.5 mm. longum; segmenta circiter 1 mm. longa, triangularia, acuta vel acuminata, barbata. *Antherae* 0.5 mm. longae, e perianthii tubo exsertae. *Stylus* 1 mm. longus, ad antherarum medium attingens. *Fructus* parvus, subglobosus,

perianthio persistente 3 mm. longus, prominenter 10-costatus, inter costas tenuiter reticulatus.

Transvaal; on the hills near Brug Spruit, 1500 m., Nov., *Schlechter* 3754!

**T. subnudum**, *L.*, var **foliosa**, *A. W. Hill*; caules foliis sparsis omnino obtecti.

Bredasdorp Div.; Elim, 153 m., *Schlechter* 7964! Port Elizabeth, *Bolus*!

**T. translucens**, *A. W. Hill*; species habitu *T. carinati*, *A. DC.*, foliis densis appressis obtectis similis, perianthii segmentis elongatis cornaceis translucens apice breviter barbatis distinguenda.

*Radix* erecta, gracilis, cinereo-alba; caules usque ad 45 cm. longi, prope e basi ramosi; rami erecti vel ascendentes, angulares, glabri. *Folia* recta vel incurva, ascendentia, lineari-acicularia, acuta, 0.8-1.2 cm. longa, circiter 0.75 mm. crassa, supra plana, costa prominente, infra carinata, glabra. *Flores* in capitulis terminales bracteatos densos 0.6-1.2 mm. diametro dispositi. *Bractee* floribus longiores, e foliis superioribus sensim evolutae, lanceolatae vel lineari-lanceolatae, acute acuminatae, rubescentes, carinatae, marginibus prope medium membranaceo-laceratis, glabrae; bracteolae bracteis paullo breviores et angustiores. *Perianthium* 4-5 mm. longum, tubo breve; segmenta lineari-lanceolata, apicibus translucens teretibus cornaceis acuta, apice breviter barbata, marginibus tenuiter papillosis. *Antherae* in perianthii tubo inclusae, 0.5 mm. longae. *Stigma* subsessile. *Fructus* non visus.

Caledon Div.; Houw Hoek, 764 m., Apr., *Schlechter* 7580! near Caledon, July, *Bolus*! Riversdale Div.; summit of Kampsche Berg, *Burchell* 7106!

**T. umbelliferum**, *A. W. Hill*; species floribus in corymbis dispositis, ex affinitate *T. fallacei*, *Schlechter*, et *T. helichrysoides*, *A. W. Hill*, sed foliis basalibus elongatis, bracteis inconspicuis, stylo elongato distinguenda.

*Caules* alti, erecti, lignosi, rotundate angulati, glabri; rami pauci, ascendentes. *Folia* magna et carnosa, subacicularia, obtusa, 2.5-5 cm. longa, circiter 2 mm. crassa, glabra. *Flores* in corymbis satis densos circiter 1.3 cm. diametro dispositi. *Bractee* pedunculis brevissimis leviter adnatae, rubescentes, circiter ad florum apices attingentes, marginibus subtranslucentibus, glabrae; bracteolae bracteis fere aequantes sed eis paullo angustiores. *Perianthium* glandulis externis conspicuis instructum, 2.5 mm. longum; segmenta lanceolata, obtusa, 1.5 mm. longa, apice barbata, marginibus pubescentibus, leviter cucullata. *Antherae* c perianthii tubo exsertae, 0.5 mm. longae. *Stylus* vix 1 mm. longus, ad antherarum medium attingens. *Fructus* ovoideo-ellipsoideus, fere 4 mm. longus, subprominenter 5-costatus, costis intermediis minus conspicuis, inter costas reticulatus.

Prince Albert Div.; tops of the mountains of Zwartberg Pass, 1200 m., *Bolus* 11,633! 12,276! *Marloth* 2489b!

**T. urceolatum**, A. W. Hill; inter species sectionis *Annulatae* floribus in racemos dispositis, antheris in perianthii tubo inclusis distincta.

*Caules* lignosi, glabri; rami patuli, angulares, glauci. *Folia* robusta, in sectio semicircularia, supra plana vel leviter concava, linearia, subacute mucronata, 1-1.5 mm. longa, circiter 1 mm. lata, carnosae, subglaucae, glabrae. *Flores* satis magni, primum in spicas confertas dispositi, demum laxe racemosi, interdum 3-nati. *Bractaeae* floribus breviores, lineari-lanceolatae vel oblanceolatae, acute mucronatae, crassae et carnosae, cymbiformes; bracteolae bracteae circiter parte tertia breviores sed ceterum eis similes. *Perianthium* 3 mm. longum; segmenta 1.25-1.5 mm. longa, ovata, subacuta, apice dense barbata. *Antherae* in perianthii tubo inclusae, circiter 0.5 longae, basi in tubo pilorum annulo instructae. *Stylus* robustus, 0.25-0.5 mm. longus, ad antherarum bases attingens. *Fructus* ellipsoideus, perianthio persistente incluso 5 mm. longus, prominenter 10-costatus, subglaucus, inter costas transverse verrucosus.

Calvinia Div.; Nieuwoudtville, *Leipoldt in Herb. Bolus.* 9377! Little Namaqualand; in hills near Brakdam, 600 m., Sept., *Schlechter* 11,138!

In this species the perianth is markedly urceolate and the anthers with the ring of golden-brown hairs are inserted well within the perianth tube (*see fig. 16*).

**T. utile**, A. W. Hill; species ramis erectis, inflorescentiis laxè paniculatis, perianthii segmentis barbatis a speciebus alteris distinguenda.

*Caules* pauci e rhizomate lignoso gracile erecto orti, prominenter costati et sulcati, glabri; rami ascendentes. *Folia* lineari-acicularia, acuta vel subacuta, circiter 2 cm. longa, 0.6-1 mm. lata, infra costa carinata satis conspicua instructa, glabra. *Flores* in bractearum axillis solitarii vel 3-nati, ad pedunculi brevis apicem siti. *Bractaeae* floribus breviores, lineares, subacutae, glabrae, integrae; bractaeae bracteis dimidio breviores, eis similes. *Perianthium* circiter 2-3 mm. longum; segmenta elliptico-lanceolata vel lanceolata, obtusa, 1.5-2 mm. longa, apice cucullata et barbata, marginibus papillosis. *Antherae* e perianthii tubo exsertae, 0.5 mm. longae. *Stylus* 0.75-1.5 mm. longus, fere ad antherarum apices attingens. *Fructus* ellipsoideo-ovoideus, 6 mm. longus, prominenter 10-11 costatus, inter costas leviter reticulatus.

Transvaal; near Pretoria, *Rehmann* 4012! 4543! 4718! hills around Pretoria, Nov., *Leendertz* 293! in fields near Heidelberg, Oct., *Schlechter* 3532! Jeppe's Town Ridge, Johannesburg, 1750 m., Feb., *Mrs. de Jongh in Herb. Galpin* 1471! Oct., *Gillfillan in Herb. Galpin* 6069! Rustenburg district, near Modderfontein, 1200 m., Jan., *Nation* 69! 70! Middleburg district, at Bronkhorstymust, Dec., *Wilms* 1309! Cape Div.; Table mountain *Schlechter* 485! possibly introduced.

Miss Olive Nation states that this plant is used by the Kaffirs to make brooms.

## II. — DIAGNOSES AFRICANAE: LXII.

1531. *Soyauxia floribunda*, *Hutchinson* [Passifloraceae—Passifloreae]; affinis *S. laxiflorae*, Gilg, sed ramulis glabris vel glabrescentibus, foliis sensim acuminatis, venis minus conspicuis, stipulis angustioribus, floribus breviter pedicellatis differt.

*Arbor* altitudine mediocris; ramuli floriferi subteretes vel leviter compressi, circiter 5 mm. crassi, in secco nigri, glabri vel minutissime puberuli; internodii 2–3 cm. longi. *Folia* oblongo-elliptica, sensim subacute acuminata, basi obtusa vel rotundata, 12–17 cm. longa, 3.5–6 cm. lata, integra, chartacea, utrinque glabra; costa infra prominens; nervi laterales utrinque 15–16, a costa sub angulo 60° abeuntes, utrinque conspicui, intra marginem recurvatum arcuati; venae infra distinctae; petioli 3.5–5 mm. longi, lateraliter compressi, circiter 2 mm. crassi, supra concavi, rugosi; stipulae lineares, apice triangulari-sub-acutae, 8 mm. longae, 1 mm. latae, subcoriaceae, glabrae. *Racemi* axillares subsimplices vel parce ramosi, terminales ramosissimi, usque ad 15 cm. longi; axes obtuse angulati vel compressi, circiter 1.5 mm. crassi, puberuli; bracteae minutissimae, deciduae; pedicelli vix 1 mm. longi, appresse tomentelli. *Flores* laxae dispositi, in alabastro depresso-globosi. *Sepala* late ovata, apice obtusissima, 4 mm. longa et lata, chartacea, extra inferne parce puberula, intra glabra. *Petala* ovato-oblonga, obtusa, sepalis aequalia vel paullo longiora, glabra. *Stamina* numerosissima; filamenta 1 cm. longa, glabra; antherae 0.5 mm. longae. *Styli* 3, liberi, 5 mm. longi, glabri, disco cupulari 0.5 mm. alto glabro circumdati.

TROPICAL AFRICA. Sierra Leone: Bunjema, June, *Aylmer* 86. Gambia? *Garret*.

1532. *Tricalysia reflexa*, *Hutchinson* [Rubiaceae—Gardenieae]; species corollae lobis 4 reflexis ore densissime villosa valde distincta.

*Frutex* vel arbor parva; ramuli virides, teretes, circiter 2 mm. crassi, inconspicue longitudinaliter sulcati. *Folia* oblonga vel oblongo-lanceolata, obtuse acuminata, basi breviter cuneata, 15–16 cm. longa, 4–6.5 cm. lata, chartacea, pallide viridia, glabra; nervi laterales utrinque 5–6, arcuati, intra marginem elongati et reticulati, utrinque conspicui; venae a costa media patulae, utrinque prominentes; petioli 0.6–1 cm. longi, 2.5 mm. crassi, glabri; stipulae late semiorbiculares, caudato-acuminatae, 5–6 mm. longae, 5 mm. latae, crasse coriaceae, glabrae. *Flores* in foliorum axillis fasciculati, pedicellati; pedicelli 2–3 mm. longi, glabri; bracteae coriaceae, brunneae, extra parce puberulae. *Receptaculum* glabrum. *Calycis* lobi patentes vel reflexi, subulato-lanceolati, acuti, 1 mm. longi, glabri. *Corollae* tubus inferne cylindricus, superne leviter ampliatus, 1 cm. longus, medio 1–5 mm. diametro, extra et intra inferne glaber, ore densissime villosus; lobi 4, valde reflexi, lanceolati, acute acuminati, 5 mm. longi, subglabri. *Antherae* exsertae, reflexae, 5 mm. longae; filamenta 2 mm. longa. *Stylus* longe exsertus, bilobus, lobis 1.5 mm. longis divergentibus parce puberulis.

TROPICAL AFRICA. Sierra Leone: Kessewe, Apr., *Lane-Poole* 131.



1533. *Lightfootia cartilaginea*, Scott [Campanulaceae—Campanuleae]; habitu ad *Wahlenbergiam* proxime accedit, *W. procumbenti*, DC. similis, sed corolla alte 5-fida foliisque alternis differt; ob corollam fere ad basin divisam ad *Lightfootium* pertinet.

*Caulis* adscendens, basi lignosus, copiose ramosus, 13–20 cm. longus, plus minusve striatus, hirsuto-pubescent. *Folia* alterna, numerosa, sessilia, lanceolata, apice acuta, basi subcordata, 0.8–1 cm. longa, 3–5 mm. lata, subrigida, margine sinuata et cartilaginea, integra vel dentibus parvis paucis instructa, nervis lateralibus obscuris, pagina superiore glabra, inferiore in costa pilis paucis subrigidis instructa. *Flores* terminales, magni, pedicellis erectis 5–8 mm. longis pubescentibus suffulti. *Receptaculum* pubescens. *Calycis* segmenta lanceolata, 4–5 mm. longa, viridia, glabra, margine cartilaginea, persistentia. *Corolla* coerulea, fere ad basin partita, segmentis lanceolatis vel subspatulatis 9 mm. longis 2.5 mm. latis. *Stamina* a corolla libera, fere 3 mm. alta; filamenta basi dilatata, breviter pilosa; antherae liberae, parvae, filiformes, sinuatae, 1.5 mm. longae. *Stylus* erectus, glaber vel basi apiceque tomentellus, 4.5 mm. longus, stigmate 3-fido recurvo tomentoso. *Capsula* sub-inferior, apice conica, 4 mm. diametro, calycis lobis persistentibus coronata.

TROPICAL AFRICA. British East Africa: grass land of North-West Kenya plains, 2000–2500 m., Battiscombe 735.

1534. *Lightfootia graminicola*, Scott [Campanulaceae—Campanuleae]; a *L. cartilaginea*, Scott, floribus minoribus nunquam singularibus facile distinguenda.

*Caules* multi a rhizomate lignoso adscendentes, basi lignosi, ramosi, 15–20 cm. longi, striati, sparse hirsuti. *Folia* alterna, lanceolata, apice subacuta, basi cordata auriculis saepe caulem amplectentibus, 1.1–1.5 cm. longa, 3–4 mm. lata, subrigida, margine crenulata et cartilaginea, dentibus paucis parvis cartilagineis instructa, nervis lateralibus utrinque obscuris, pagina superiore glabra, inferiore glabra nisi costa pilis paucis subrigidis instructa, sessilia. *Inflorescentia* spiciformis, 5–8 cm. longa. *Flores* axillares, 1–2 in axilla quoque, subsessiles vel pedicellis 1–3 mm. longis suffulti. *Receptaculum* conicum, 1.5 mm. altum, hirsutum. *Calycis* segmenta lanceolata, 2 mm. longa, margine cartilaginea, dorso ad costam pilis paucis instructa, persistentia. *Corolla* fere ad basin partita, segmentis lineari-lanceolatis 6–6.5 mm. longis 1 mm. latis dorso ad costam pilis paucis instructis. *Stamina* a corolla libera; filamenta basi late alata. *Stylus* erectus, basi levissime dilatatus, apice cylindricus, carnosus; stigma late trilobum, albo-coeruleum, tomentellum.

TROPICAL AFRICA. South-West Africa: South Angola, Humpata, 1800 m., Pearson 2776.

1535. *Sideroxylon Aylmeri*, Scott [Sapotaceae]; floribus pluribus ramulorum juniorum apicibus et nodis foliatis fasciculatis facile distinguendum.

*Arbor* magna, laticifera, glabra, dichotome ramosa, ramorum

cortice cinereo-fusco. *Folia* apicibus nodisque ramulorum plus minusve 2-4 conferta, petiolata, obovato-lanceolata vel elliptico-oblancheolata, basi subcuneata, apice obtuse acuminata acumine 5-8 mm. longo 3-4 mm. lato, 8-15.5 cm. longa, 3-5 cm. lata, integra, coriacea, glaberrima, costa crassa lignosa in pagina utraque distincta et elevata, nervis lateralibus supra subobscuris sed levissime elevatis infra distinctis elevatis e costa sub angulo 75° abeuntibus intra marginem 7-9 mm. divaricatis et anastomosantibus; petioli 1.75-2 cm. longi. *Flores* nodis foliatis fasciculati, numerosi e nodo utroque 50-80, pedicellati pedicellis 1.4-1.5 cm. longis pubescentibus. *Calycis* segmenta imbricata, ovata, subacuta, sub anthesi 3.5-4 mm. longa, 2.5-3 mm. lata, coriacea, fusca, pubescentia. *Corollae* segmenta tenuissima, albida, triangulari-ovata, acuta, circiter 2.5 mm. longa, glabra. *Staminum* filamenta brevissima, alabastro 0.5 mm., sub anthesi 1-1.5 mm. longa; antherae magnae, triangulares, mucronatae, 2.25-2.5 mm. longae, 0.5-0.75 mm. latae, extrorsum dehiscentes. *Staminodia* scariosa, petaloidea, ovata, acuta, 2-2.5 mm. longa, 1-1.5 mm. lata, integra vel margine levissime lacerata et parce pilosa. *Ovarium* 5-loculare, hirsutum; stylus crassus, 3-4 mm. longus sed sub anthesi plus minusve elongatus; stigma minutum, integrum. *Fructus* magnus, 7-8 cm. diametro. *Semina* oblique et anguste ellipsoidea, 3.5 cm. longa, 1.5 cm. lata, testa crustacea nitida brunnea hilo infra apicem paulum excavato basi sulcato fere ad basin extenso instructa.

TROPICAL AFRICA. Sierra Leone: Falaba, April, *Aylmer* 57: May, *Lane Poole* 235.

1536. **Baissea Lane-Poolei**, *Stapf* [Apocynaceae-Echitidei]; affinis *B. leonensi*, Benth., sed facile corolla late infundibulari-campanulata latiloba distinguenda.

*Frutex* alte scandens, trunco basi ad 30 cm. diametro; ramuli viridi-fuscescentes, tenuissime puberuli. *Folia* obovata vel oblongo-obovata, basi acuta, apice subito in acumen breve obtusiusculum vel obtusum 0.4-1 cm. longum producta, 6.5-8 cm. longa, 3.5-4.5 cm. lata, tenuiter coriacea, glaberrima nisi in nervorum axillis acarodermiis rufo-pubescentibus munita, pallide viridia, nervis lateralibus utrinque 4-5 tenuibus prominulis, venis laxiusculis e costa angulo subrecto emissis; petioli graciles, 1-1.2 cm. longi. *Paniculae* axillares, ad cymas 2-6-floras reductae et terminales ad 3 cm. longae, pluriflorae, tenuiter fusco-puberulae; pedunculi graciles, 1-1.8 cm. longi; bractee minutae, ovatae, subacutae; pedicelli 3-5 mm. longi. *Calyx* late cupularis, 2 mm. longus; sepala late ovata, obtusa, praeter margines minute fusco-puberula. *Corolla* albida (?), infundibulari-campanulata, 8 mm. longa, substantia crassiuscula; tubus 3-3.5 mm. longus, latus, extra densissime minute fusco-tomentellus, intra praeter pilorum reversorum fasciculos inter callos positos et pubem infra callos ad staminum bases decurrentem glaber, callis transversis distinctis; lobi ovato-oblongi, obtusi, 4-4.5 mm. longi, obtusi. *Staminum* conus corollae os attingens; antherae 3 mm. longae, dorso glabrae. *Discus* distinctus, 5-crenatus. *Carpella* dense tomentosa.

TROPICAL AFRICA. Sierra Leone: York Pass, *Lane-Poole* 322.

1537. *Pleiocarpa tricarpellata*, Stapf [Apocynaceae-Plumeroideae]; affinis *P. muticae*; Benth. et *P. salicifoliae*, Stapf, ab utraque differt foliis anguste oblongis laxius nervosis, ab illa praeterea carpellis 3-nis (haud 5-nis) 2-ovulatis, ab hac floribus longioribus.

*Frutex* glaberrimus, ramulis fuscis quadrangulis, lenticellis parvis majusculis. *Folia* oblonga, basi breviter acute attenuata, apice in acumen 0·8–1·8 cm. longum obtusum producta, 15–18 cm. longa, 4–5·5 cm. lata, tenuiter coriacea, utrinque nitidula, nervis lateralibus utrinque 9–11 tenuibus, venis tenuissimis; petioli 6–7 mm. longi. *Flores* in glomerulos resina indutos 5–6-flosos axillares congesti. *Calyx* 2 mm. longus; sepala ovato-oblonga, obtusa. *Corollae* tubus 1·5–2·2 cm. longus; lobi oblongi, obtusi, 7–8 mm. longi. *Carpella* 3, ovulis 2-nis.

TROPICAL AFRICA. Sierra Leone: Falaba. G. Aylmer, 35 (comm. C. E. Lane-Poole).

1538. *Vitex keniensis*, Turrill [Verbenaceae-Viticeae]; *V. milanjiensis*, Britten, affinis sed foliolis oblongo-ellipticis basi rotundatis vel subacutis haud cuneatis longius petiolulatis chartaceis differt.

*Arbor* usque ad 24–27 m. alta (ex *Hb. Battiscombe*). *Folia* quinquefoliolata, petiolo incluso usque ad 3·3 dm. longa, 2·8 dm. lata, petiolo usque ad 13·5 cm. longo terete vel leviter compresso ferrugineo-pubescente vel tomentoso suffulta; foliola oblongo-elliptica, apice breviter acuminata, basi rotundata vel subacuta, saepissime leviter obliqua pagina superiore pubescente praecipue in costa nervisque leviter impressis inconspicue transverse venosa, pagina inferiore ad costam nervosque prominens ferrugineo-pubescente vel fere tomentosa caeterum pubescente, nervis lateralibus marginem versus anastomosantibus; foliolum terminale 16–17 cm. longum, 8·5 cm. latum, nervis lateralibus utrinque circiter 16, petiolulo 4 cm. longo adjecto; foliola lateralia 15 cm. longa, 8·5 cm. lata, nervis lateralibus utrinque circiter 15, petiolulo 3–3·25 cm. longo suffulta; basalia 10·5 cm. longa, 6–6·5 cm. lata, petiolulo 1·5–1·75 cm. longo; petioluli ferrugineo-tomentosi. *Inflorescentia* terminalis (vel interdum axillaris?), pedunculo usque ad 13 cm. longo excluso 14 cm. longa, 24 cm. lata, laxe dichotome ramosa, ramis ferrugineo-pubescentibus vel tomentosis; bracteae 0·5–1 mm. longae, 1–4 mm. latae, subtus dense ferrugineo-tomentosae, supra glabrae. *Flores* extra ferrugineo-tomentosi, pedicello 1 mm. longo suffulti. *Calyx* sub anthesin campanulatus, 4 mm. longus, 4 mm. latus, fere truncatus, dentibus 5 late triangularibus 0·5 mm. longis 1·5 mm. latis inconspicuis instructus; infructescens late campanulatus, usque ad 1 cm. longus et 1·1 cm. latus. *Corollae* tubus late cylindricus, superne gradatim ampliatus, 5 mm. longus, basi 2·5 mm. diametro, fauce 4 mm. diametro; limbus quinquelobatus, lobo antico late orbiculari 3 mm. longo 3·5 mm. lato, lobis lateralibus oblongis 3 mm. longis 2 mm. latis, anticis oblongo-ovatis 2·5 mm. longis 2 mm. latis. *Stamina* 4, cum stylo leviter exserta, antheris 0·75 mm. longis; duo antica filamentis 4 mm. longis inferne dilatatis barbatis; duo postica filamentis 3 mm. longis basi

barbatis. *Ovarium* sphaericum, 1.75 mm. diametro, apice barbatus; stylus 6 mm. longus, apice bifidus, glaber. *Fructus* pyramidalis 1.1 cm. altus, 8 mm. diametro, glaber.

TROPICAL AFRICA. British East Africa; Mt. Kenia, 1500-1800 m., *D. K. S. Grant* (ex *Hb. Battiscombe*) 846.

This is one of the most important timber trees of North-East and Eastern Kenia, where it attains a height of 80-90 feet. The timber is light, easily worked and of a good appearance, the grain much resembling teak. The native (Meru) name is Moru or Muhuru.

The species is especially distinguished by its oblong-elliptic leaflets which have comparatively long petiolules, the ferrugineous tomentum which appears on most parts of the plant, and the large dichotomously branched inflorescences. From the dried material at present received it seems that at least some inflorescences are terminal, but it is possible that axillary ones are also produced. The persistence and enlargement of the calyx characteristic of the genus is particularly noticeable in this plant owing to the somewhat isolated position of the fruits with the enlarged calyces in the forks of the inflorescence produced by the dichotomous nature of the branching.

1539. *Phyllanthus flacourtioides*, *Hutchinson* [Euphorbiaceae-Phyllanthaceae]; affinis *P. discoideo*, Muell. Arg., sed disco in floribus glandulis liberis constituto differt.

*Rami* teretes, glabri; ramuli juniores glabri, sicco nigrescentes. *Folia* elliptica vel oblongo-elliptica, utrinque plus minusve rotundata, 0.8-5 cm. longa, 0.6-2.5 cm. lata, integra, tenuiter chartacea, glabra; nervi laterales utrinque circiter 6, arcuati, graciles, distincti; veni infra laxe anastomosantes; petioli circiter 4 mm. longi, glabri; stipulae lineari-lanceolatae, acutae, satis membranaceae, circiter 4 mm. longae, glabrae, costa distincta et marginibus subhyalinis. *Flores* ut videtur dioici; ♂ ad ramulorum apices fasciculati; pedicelli 3 mm. longi, ad apicem leviter incrassati, glabri. *Sepala* 4, obovata, apice rotundata, 1.5 mm. longa, 1.25 mm. lata, glabra. *Disci glandulae* parvae, tenues, rotundatae, laeves. *Stamina* 4; filamenta libera, antheris circiter dimidio breviores; antherae ellipsoideae, 1 mm. longae, lateraliter dehiscentes. *Flores* ♀ ramulorum juniorum basin versus subsolitarii; pedicelli fructiferi 9 mm. longi, glabri. *Sepala* 4, late ovata, obtusa, 2.5 mm. longa, 2 mm. lata, submembranacea, glabra. *Discus* annularis, parvus. *Fructus* immaturus trilobatus, glaber. *Styli* inferne connati, parte libera abrupte recurvata et fere ad basin bilobata.

SOUTH AFRICA. Delagoa Bay: Lorenzo Marques, 45 m., *Schlechter* 11,598; 11,634.

1540. *Torulinium angolense*, *Turrill* [Cyperaceae-Scirpeae]: *T. VahlII*, C. B. Clarke, affine sed spiculis latioribus, glumis acuminatis facile distinguendum.

*Herba* perennis, glabra, erecta, usque ad 9 dm. alta, dense caespitosa, caulibus acute triquetris basi tuberosis foliorum vaginis plus minusve fibrosis dense obtectis. *Folia* omnia



manca, linearia, saltem 2·3 dm. longa, 5 mm. lata, margine leviter serrata, vaginis laevibus purpureis. *Inflorescentia* terminalis, composita, umbellata, umbellis radiis usque ad 8 cm. longis instructis vel sessilibus, umbellis secundariis paucis vel multi-spiculatis; spiculae circiter 10–12-florae, 6 mm. longae, 3 mm. latae; bracteae foliis similes, usque ad 8 mm. latae. *Glumae* late ovatae, 2·25 mm. longae, 2 mm. latae, acuminatae, margine leviter ciliatae, distincte nervatae, costa superne leviter serrata. *Stamina* 3, filamentis 2 mm. longis. *Ovarium* obovato-ellipticum; stylus ramis tribus 1·5 mm. longis inclusis 2 mm. longus. *Nux* ambitu obovato-elliptica, acute triquetra, 1·5 mm. longa, 1 mm. diametro, intense castaneo-brunnea vel fere nigra.

TROPICAL AFRICA. Angola; Benguella, country of the Ganguellas and Ambuellas, *Gossweiler* 2989.

The spikelets bear a general resemblance to those of *Cyperus aristatus*, Rottb., though the glumes are not so acuminate. The chief difference between *Torulinium* and *Cyperus* is that in the former genus the rhachis ultimately breaks up into as many portions as there are glumes and nuts, while in the latter the rhachis is persistent, the glumes and nuts falling off separately.

### III.—MISCELLANEOUS NOTES.

**Additions and alterations to Gardens, 1914.**—Additions to the collections of plants cultivated at the Royal Botanic Gardens, Kew, have been made during the year by exchanges with other gardens, private as well as public, and by purchase from nurserymen and others. Naturally, the international character of the exchanges suffered to some extent during the concluding months of the year. Contributions of plants and seeds received from Botanic Gardens and other institutions include the following:—

Beleim, Municipio de.—Palms from the International Rubber Exhibition.

Brisbane.—Wardian case of filmy ferns.

British East Africa.—Native seeds.

Brussels Colonial Garden.—Rubber and Fibre plants from International Rubber Exhibition; plants of *Agave tequilana*.

Calcutta.—Orchids; Himalayan seeds.

Christchurch, N.Z.—Collection of native seeds.

Dunedin.—Filmy ferns; tubers of *Convolvulus chrysorrhizus*; collection of native seeds.

Hong Kong.—Wardian case of plants.

Jamaica.—Large consignment of filmy ferns; succulent plants; seeds.

Königsberg.—Bromeliads.

Koshun.—Various seeds.

Missouri.—Succulent plants.

New South Wales.—Plants of *Telopea speciosissima*.

New Zealand Government.—Collection of *Phormium tenax* vars.

St. Lucia.—*Ionopsis utricularioides*.

South Africa, National Botanic Garden.—Various seeds.

Southern Nigeria.—Oil palms from International Rubber Exhibition; *Dioscorea* tubers.

Singapore.—Two Wardian cases of plants.

Sydney.—Collection of seeds.

Tiflis.—Various seeds.

Trinidad.—Filmy ferns; orchids.

United States Department of Agriculture.—Succulent plants; seeds.

Victoria, Kamerun.—Native seeds.

Zanzibar.—*Amorphophallus* and *Gonatopus* tubers.

Exchanges were made with the Botanic Gardens of Cambridge, Oxford, Edinburgh, Glasgow, and Glasnevin, and with most of the European gardens upon which Kew is largely dependent for seeds of those annual herbaceous plants which fail to produce seeds at Kew.

Other donations to the Gardens include the following:—

Mr. J. F. G. Bannatyne, Haldon House, near Exeter.—Large plant of *Davallia Mooreana*.

Bees, Ltd., Liverpool.—Collections of Chinese seeds.

Dr. L. Cockayne, New Zealand.—Filmy ferns.

Mr. M. T. Dawe, Okehampton.—Brazilian plants and seeds.

Mr. J. Gossweiler, Angola.—Plants and seeds.

Mr. A. Hislop, Rhodesia.—Plants and seeds.

Mr. R. Hoffmann, Streatham.—Caladiums.

Messrs. C. B. Kloss and H. C. Robinson, Federated Malay States.—Sumatran seeds.

Lady Lawrence, Burford.—Collection of botanical orchids.  
(See *Kew Bull.*, 914, p. 172.)

Mozambique Company.—Seeds of *Balanites* new spp.

Dr. G. V. Perez, Teneriffe.—Seeds of Canary Island plants.

Mr. H. Perrier de la Bâthie, Madagascar.—Germinating seeds of *Uapaca clusiacea*.

Mrs. Robinson, South Kensington.—Four orange trees.

Messrs. Sauder and Sons, St. Albans and Bruges.—New plants: orchids and others.

Mr. G. Thornecroft, Barberton.—South African seeds.

Mr. J. C. Williams, Caerhays.—Chinese seeds collected by Mr. G. Forrest; plants.

Messrs. J. Veitch and Sons, Ltd., Chelsea.—Winter-flowering begonias and other plants.

Mr. J. Burt-Davy, Transvaal; Major Light, India; Mrs. Nevill, Norwich; and Mr. E. Seimund, Federated Malay States.—Orchids.

Among the plants and seeds of interest distributed from Kew during the year were the following:—*Acacia spectabilis* (seeds), *Agave tequilana*, *Balanites Dawei* and *B. Maughamii* (seeds), seeds of Canary Island plants received from Dr. G. V. Perez, Cauto cotton (seeds received from Jamaica), Chinese trees and shrubs of recent introduction, *Convolvulus chrysorrhizus* (tubers), varieties of *Phormium tenax*, West African 'Yams,' seeds of *Quercus Ilex* in quantity to Colonial Forestry Department, and *Zizyphus vulgaris* vars. (seeds), surplus aquatics and young palms.

The distribution of plants to Colonial and Indian gardens was as usual.

Surplus trees, shrubs and herbaceous plants were presented to public institutions, notably to the Royal Parks, London, Kew Observatory, Magdalen College, Oxford, and the new Cattle-testing Station of the Board of Agriculture.

There was a large demand for seeds ripened at Kew and offered for distribution in *Bulletin*, Appendix I, 1914.

A further portion of the Rock Garden was reconstructed with weathered mountain limestone obtained from the Cheddar district.

The filmy fern collection was rearranged and strengthened with the assistance of correspondents in the Colonies, among whom we are particularly indebted to The Hon. H. H. Cousins, Director of Agriculture, and to Mr. Harris, Superintendent of Public Gardens, Jamaica, for the magnificent cases of Jamaican Filmy ferns. The ferns were in many instances sent attached to the stems, etc., on which they were growing, and arrived at Kew almost as fresh as when they were collected. A fine collection was also received from Dr. L. Cockayne, New Zealand, which reached Kew in excellent condition; and the Assistant Director of the Botanic Gardens, Trinidad, sent an interesting and representative collection of Filmy ferns from that island.

The collection was further augmented by the purchase of a number of specimens from Dr. Winter, of Brighton.

**Work in the Grounds.**—The depletion of the staff owing to the war has necessitated the postponement of any extensive works of alteration or improvement in the grounds for this winter. One arduous task that has had to be deferred on this account is the cleaning out of the Lake. In October, however, the vegetation on the four islands was overhauled and considerably thinned. Owing to the abundant moisture their roots enjoy, the trees on these islands grow very luxuriantly, and on each island the vegetation had become consolidated into a heavy solid-looking mass.

The completion of the new Refreshment Pavilion last autumn has occasioned a considerable work of renovation. A large area of lawn adjoining the Pagoda Vista was taken over for the erection of a refreshment tent and temporary buildings. This has had to be levelled and relaid with turves carted from other parts of the grounds; new gas and water pipes have had to be put down; and a gravelled area round the Pavilion 4 to 8 yards wide has been made, as well as a service path from it to the adjoining entrance gate in Kew Road.

On the narrow strip of ground between the wall abutting on Kew Road and the walk that runs almost parallel with it from the Victoria Gate to the Lion Gate, a considerable amount of mixed deciduous vegetation has been replaced by evergreen trees and shrubs. This has been done with the object of forming a dense screen shutting out from view all the year round, as much as possible, the omnibuses, road-engines and other features of a busy suburban thoroughfare that at present disturb the amenities of this charming and popular walk.

**The Arboretum Collections.**—One of the most troublesome

problems of this and recent planting seasons has been the provision of space for the enormous number of new hardy trees and shrubs, chiefly from China, that have been added to the Kew collections. In putting out these plants in permanent places, two important matters have to be kept in view. One is that these new species should be placed in contiguity to others of the same genus, so that visitors may be enabled to find reasonably quickly, by means of the published guide, the tree or shrub they desire to study or compare. The other consideration is that the landscape beauties of Kew, which it has been the aim of successive Directors to maintain and develop, should not be affected. There is scarcely anything more calculated to detract from the dignity of a demesne like that of Kew, with its fine old trees and spacious vistas and lawns, than the promiscuous planting of a large number of small trees just out from nursery quarters.

The general lines of the Kew Arboretum were laid down by Sir Joseph Hooker about forty years ago, at a time when the present enormous accretions of material could not have been foreseen. The spaces originally allotted to certain genera and families have consequently proved quite inadequate. In some instances it has been necessary to move an entire genus or even Natural Order to a new site so that the development of a neighbouring one may be provided for. This involves much labour, and for it to be done without incurring serious or perhaps irreplaceable losses very careful transplanting is necessary.

**Hybridising Trees.**—In association with Prof. A. Henry, of the Royal College of Science, Dublin, some experiments in the hybridisation of timber-producing trees have been carried out. The extraordinary vigour of some hybrid trees such as *Salix coerulea*, *S. Salamoni*, *Populus serotina* and *P. Eugenei*, various elms, etc., without counting more doubtful instances like the London plane and common lime, led Prof. Henry to attempt the production of others of equal or perhaps greater value, whose origin (unlike most or all of those mentioned) would be known and recorded. The experiments were carried out on larches, poplars, ashes, alders, oaks and walnuts, and the isolation of the flowers, their cross-fertilising, as well as the protection and gathering of the seeds, was done by members of the Kew staff. Seeds were developed on two larches, seven poplars, nine ashes, one alder, two oaks and one walnut. Of these, all the poplars and oaks as well as four ashes have already germinated.

**Storms at Kew.**—On four occasions during 1914 Kew suffered by storms. The most serious loss occurred on March 16th, when the large and famous old tulip tree at the north end of the Rhododendron Dell was blown down. (See *K. B.* 1914, p. 173.) In May, and again in June, Kew was visited by thunderstorms. On each occasion, curiously enough, a tall Atlas cedar was struck by lightning. Probably the most violent wind-storm of the year occurred on December 28th between 8 and 10 p.m. As in March, the ground had been softened by heavy and persistent rain (totalling over 6 inches during December) and some eight or



nine trees of goodly size were blown down. One was the largest common ash Kew possessed, which stood on the eastern side of the *Rhododendron* Dell. A very healthy and handsome specimen of *Pinus Sabiniana* near the Isleworth Ferry Gate went down. This pine—the ‘Digger’ pine of N.W. America—is no longer very common in cultivation. A tall beech in the wood S.W. of the Azalea Garden also fell. Seeing the considerable age of most of the beeches in Kew, and the fact that many show evidences of having reached their period of decadence, the loss of but one of them may be regarded as a fortunate escape in a storm of such extraordinary violence as this. Nothing else of particular value was lost, although the destruction of one of the middle-sized elms on the river side of Queen Elizabeth’s Lawn makes a noticeable gap in the row there.

**Additions to Arboretum.**—The final sales by auction of the collections in the Coombe Wood Nursery of Messrs. Veitch enabled Kew to obtain a few of the large specimens of rare trees and shrubs growing there. The fine *Trochodendron aralioides* that had so long been an interesting feature at Coombe Wood is now established near the Sun Temple at Kew. It is 10 feet or so high and is the oldest, perhaps the largest, example of this remarkable Japanese tree in the country. It flowered profusely in its new quarters last April and May, and its flowers, although green, are very striking, and attracted much attention from visitors. The only plant of *Sassafras Tzumu* ever raised from seed in this country was presented by Messrs. Veitch. This tree is of remarkable interest as the Asiatic representative of the *Sassafras* of North America—each being the sole example of its genus on the respective continents. The Coombe Wood tree had made enormously thick roots without fibre and has felt its removal so severely that it may not recover, although it is being nursed under glass. Two young plants raised from it are, however, quite healthy. A good plant of the new *Diospyros armata*, an ally of the Persimmon and kaki, was purchased, and is planted near No. II. Fernery. Excellent specimens of the Southern beeches, *Nothofagus fusca* and *N. cliffortioides*, each 12 to 15 feet high, were bought, also the rare *Pterocarya hupehensis*, *Rosa omeiensis* and *Schizandra Henryi*.

Rare Chinese shrubs have also been presented by Mr. J. C. Williams, Mr. Maurice L. de Vilmorin, Miss E. Willmott, Mr. P. D. Williams, Mr. Gerald Loder and Mr. F. R. S. Balfour. Mr. Balfour has also presented some new and interesting species from North-west America. Mr. A. Waterer gave some new varieties of garden rhododendrons raised at Knap Hill, the home of so many famous hybrids. Mr. Elwes, from his garden at Colesborne, has contributed a number of trees which possess a certain historical interest in being derived from notable trees or sites—such as a beech raised from the famous one at Newbattle, a Lucombe oak from the Killerton tree, an Oriental plane from the Temple of Diana, at Ephesus, etc.

*Cupressus formosensis*.—Seeds of this remarkable cypress were presented by Mr. H. Clinton-Baker in 1911. They germinated well, and about two dozen plants were raised which have

lately been planted in the Southern Pinetum and elsewhere. Examples of this cypress have been found in Formosa upwards of seventy feet in girth of trunk. It is, therefore, one of the giant trees of the globe, and the most gigantic conifer of the Old World—worthy to be compared with the mammoth trees of California. It is evidently most closely allied to the Japanese *C. pisifera*, having the same sharply-pointed leaves, but without the white stomatic patches beneath seen in that species. The young trees are very healthy and vigorous, and assuming that they will prove hardy, it is very satisfactory to have got so interesting a tree well established in our collections.

The following trees and shrubs have flowered in the Arboretum Department for the first time:—

*Acanthopanax leucorrhizum*.

„ *scaberulum*.

*Alnus cremastogyne*.

*Berberis levis*.

*Betula alnoides pyrifolia*.

*Callicarpa* sp. (? *Giraldiana*) (fruit very handsome).

*Clematis brachyura*.

„ *glauc* var. *akebioides*.

*Corylopsis platypetala*.

„ „ var. *laevis*.

„ *sinensis*.

„ *Willmottiae*.

*Evodia hupehensis*.

*Pyrus kansuensis*.

„ *scalaris*.

„ *yunnanensis*.

*Rhododendron Davidsonianum*.

„ *Fargesii*.

„ *Hanceanum*.

„ *longistylum*.

„ *moupinense*.

„ *villosum*.

„ *yanthinum*.

*Vaccinium neglectum*.

*Viburnum betulifolium* (fruit brilliant red).

**Waterfowl.**—The past season was on the whole a highly successful one, and though the number of birds reared was not so large as in the previous year it included several birds not bred before at Kew.

Among the birds reared were Carolinas; Mandarin; Common Red-crested, and White-eyed Pochards and Tufted Ducks; Common Sheldrake; Brazilian, Common and Chilian Teal; Bar-headed, White-fronted, Canadian and other geese and a black-necked Swan.

The Storks were again disturbed this year and failed to hatch out their eggs, and one of the pair of black-necked swans was killed when about a fortnight old by a visitor, who threw a stone at it, apparently to try and make it leave its mother's back. The Badger was again active among the geese by the lake during the

breeding season, and was in consequence deported. When digging him out it was of interest to find his earth carpeted with masses of blue-bell leaves and flowers, and also to discover the skeletal remains of some of our birds. Rats have also caused some serious losses.

Among interesting birds added to the Kew collection by presentation of exchange during the past year, may be mentioned a pair of American Widgeon from Mr. W. H. St. Quintin, of Scampston Hall, Rillington, York; two pairs of Falcated Teal and a pair of Ringed Teal. A pair of Crowned Cranes has also been added and a pair of pale-grey Guinea-fowl presented by Mrs. Orde, of Nunnykirk, Morpeth.

---

**Official Visits.**—During the past year the vote for travelling expenses has been utilised as follows:—

The Director.—Being deputed by the Board of Agriculture and Fisheries to attend the International Phytopathological Congress which was held at Rome.

The Curator.—In visiting the Royal Botanic Gardens, Edinburgh, and horticultural establishments in Scotland.

The Assistant Curator.—In visits to gardens in Cornwall.

Mr. Sprague, Assistant in the Herbarium.—For the purpose of examining types of African plants in the Berlin Herbarium.

The Keeper of the Museums.—In a visit to Liverpool for the examination of imported tropical products, etc.

Mr. W. Dallimore, Assistant in the Museums.—In a visit to Swansea in connection with forestry exhibits at the Bath and West and Southern Counties Show.

Other visits which had been planned had to be postponed owing to the outbreak of hostilities.

---

**Museums.**—A considerable number of interesting products have been added to the collections during the past year, and these have been recorded from time to time in the *Bulletin*. Special mention must be made of the large amount of material consisting of specimens of rubber and miscellaneous tropical products obtained from the various sections of the International Rubber Exhibition held in London during the summer. These products have been dealt with and incorporated in the permanent collections.

Duplicate products have been distributed to various institutions, including the Royal College of Science, Dublin; the London County Council, for the Geffrye Museum; Art Gallery and Museum, Rochdale; Public Library and Museum, Colne, Lancashire, etc.

Many products have been received for determination and for general information as to the properties and uses and for references to the literature bearing upon the same. This is a most important work of the department, and the large number of enquiries received are evidence that the Museums have of recent years become of increasing importance to the commercial community.

The relabelling of the contents of Museum No. I. has gone on steadily during the year. In Museum No. IV. much new material has been prepared and placed in position, and an additional wall case has been provided in one of the upper rooms.

As in former years an exhibit, consisting chiefly of duplicate material, was prepared for the Bath and West and Southern Counties Show held at Swansea.

Since the outbreak of war five of the six Museum porters have rejoined the Army, with the result that the Department is somewhat handicapped and much necessary work has had to be postponed.

A new edition of the Guide to the North Gallery was produced during the year.

J. M. H.

### Research in Jodrell Laboratory in 1914:—

**Boodle, L. A.**—On the Trifoliolate and other Leaves of the Gorse (*Ulex europaeus*, L.). (Ann. Bot., vol. 28, pp. 527–530.)

**Boodle, L. A.**—The Ringing of Trees. (Kew Bull., 1914, pp. 222–225.)

**Bower, F. O.**—Studies in the Phylogeny of the Filicales. IV. *Blechnum* and Allied Genera. (Ann. Bot., vol. 28, pp. 363–431, with eleven plates and twenty-six figs. in text.)

**Massee, G.**—How Saprophytic Fungi may become Parasites. (Kew Bull., 1914, pp. 190–191.)

**Massee, G.**—Black-Knot of Birch. (Kew Bull., 1914, pp. 322–325, with five figs. in text.)

[**Massee, G.**]—Bad Germination of Wheat Seed. (Journ. Board Agric., vol. 20, pp. 894–896, with one plate.)

[**Massee, G.**]—Diseases of Peas. (Journ. Board Agric., vol. 21, pp. 418–423, with one plate.)

**Massee, Miss Ivy.**—A Mildew on *Veronica hulkeana*. (Gard. Chron., 1914, I., p. 339.)

**Massee, Miss Ivy.**—Observations on the Life-History of *Ustilago Vaillantii*, Tul. (Journ. Econ. Biol., vol. 9, pp. 9–14, with one plate.)

**Massee, Miss Ivy.**—Clover and Lucerne Leaf-Spot. (Journ. Econ. Biol., vol. 9, pp. 65–67, with four figs. in text.)

**Massee, Miss Ivy.**—On the Presence of Hybernating Mycelium of *Macrosporium Solani* in Tomato Seed. (Kew Bull., 1914, pp. 145–146, with one plate.)

**Sprague, T. A., and Boodle, L. A.**—West Indian Boxwood (*Casearia praecox*, Griseb.). (Kew Bull., 1914, pp. 214–219.)

**Thomson, R. B.**—The Spur Shoot of the Pines. (Bot. Gazette, vol. 17, pp. 362–385, with four plates and two figs. in text.)

**Worsdell, W. C.**—The Morphology of the 'Corona' of Narcissus. (Ann. Bot., vol. 28, pp. 541–543, with three figs. in text.)



Mr. L. A. Boodle studied examples of conerescent leaves in *Pinus*, and other abnormal specimens, and examined the anatomy of several plants including West Indian Boxwood: see above.

Mr. M. Drummond was engaged in a research on the structure and function of the hydathodes of various species of plants.

Mr. E. W. Fenton made some observations on a species of *Peridermium*.

Miss E. M. Jesson examined the structure of the hairs on the leaves of certain species of *Rhododendron*, and studied the spikelet of a new genus of Grasses.

Miss I. Massee completed a research on the occurrence of the mycelium of a *Macrosporium* in Tomato seeds, and studied the life-histories of several Fungi causing diseases of plants: see above.

Dr. H. Schmidt carried out some experiments on the behaviour of aqueous solutions under conditions of capillary conduction.

Prof. G. K. Sutherland investigated the life-history of a Fungus parasitic on cabbage, and made a study of some new marine Fungi, and of certain features in the anatomy of *Spartina Townsendi*.

Mr. W. C. Worsdell studied numerous teratological specimens in relation to their morphological nature, and continued his investigations on the vascular anatomy of the Dicotyledons: see above.

---

**Pathology.**—The amount of material submitted to Kew for investigation increases in quantity year by year. This is the outcome of a clearer grasp by cultivators at large of the true causes of disease, which in past times were attributed to an angered Deity, or to the influence of 'blight.' The dry season specially favoured the development and rapid spread of mildew. *Peronospora grisea*, De Bary, a mildew common on many of our wild speedwells and allied plants, has succeeded in establishing itself on our exotic species of *Veronica*, *V. Hulkeana* being especially susceptible. Cereal-blight, caused by *Sphaerella Tulasnei*, Jans., has been very much in evidence, the ears becoming blackened by its conidial form known as *Cladosporium herbarum*, Pers. The wheat crop has suffered most. There is evidence to show that various diseases due to fungi and mites respectively are being imported along with bulbs, and the sterilisation of consignments of bulbs, even when apparently sound, is advisable. As usual, various consignments of diseased plants from British Possessions have been dealt with.

---

**Additions to the Herbarium during 1914.**—During the year about 25,500 specimens were received as donations or exchanges, and 13,500 acquired by purchase, while 4,400 were received on loan in addition to those temporarily deposited for the preparation of the 'Flora of Madras.' The principal collections are enumerated below:—

EUROPE.—*Presented*: Iceland, by Mr. W. B. Turrill; Orkneys, by Col. H. Halcro Johnston; Ireland, by Mr. R. Lloyd Praeger;

Russia, by the Imperial Botanic Garden of Peter the Great, Petrograd; C. Crossland, British Fungi, by the Bentham Trustees.

*Purchased*: H. Dahlstedt, Taraxaca Scandinavia Exsiccata, fasc. 3; Dr. A. v. Hayek, Centaureae Exsiccatae Criticae, fasc. 2; Fiori and Béguinot, Flora Italica Exsiccata, Cent. xix.-xx., and Xylotomotheca Italica; Dr. M. Gandoger, Crete; G. Woronow, Herbarium Florae Caucasicae, fasc. 2-3.

CHINA.—*Presented*: E. H. Wilson and W. Purdom, by Messrs. Jas. Veitch and Sons; G. Forrest, by the Royal Botanic Gardens, Edinburgh.

*Purchased*: E. H. Wilson (per Prof. C. S. Sargent).

INDIA.—*Presented*: Wallichian Herbarium (supplementary specimens), by the Linnean Society; India (chiefly Northern), by the Royal Botanic Gardens, Calcutta; Kashmir, by Mr. G. L. C. Fuller; Nepal (Lieut. Lal Dhoj), by Lt.-Col. J. Manners Smith; Bengal and United Provinces, by Mr. H. H. Haines; Burma, by Mr. J. H. Lace; Malay Peninsula, by Mr. H. C. Robinson and the Royal Botanic Gardens, Calcutta; Indian mosses, by Mr. L. J. Sedgwick.

*Purchased*: Rev. A. Saulière, Madras.

MALAYA.—*Presented*: Siam, by Dr. A. F. G. Kerr, Mrs. D. J. Collins, Phra Vanpruk and Mr. H. B. G. Garrett; Philippine Islands, Mr. Oakes Ames; Java and Borneo, by the Buitenzorg Botanic Garden; Dutch New Guinea (C. Boden Kloss), by the Trustees of the British Museum.

*Purchased*: A. D. E. Elmer, Philippine Islands.

AUSTRALIA.—*Presented*: Western Australia, by Dr. F. Stoward; Northern Australia, near Port Darwin, by Mr. C. E. F. Allen.

NEW ZEALAND.—*Presented*: By Dr. D. Petrie.

*Purchased*: Miss J. E. Tilden.

POLYNESIA.—*Purchased*: Miss J. E. Tilden, Tahiti.

TROPICAL AFRICA.—*Presented*: Sierra Leone, by Mr. N. W. Thomas, Mr. C. E. Lane-Poole and Mr. G. Aylmer; Gold Coast, by Mr. T. F. Chipp; Nigeria, Southern Provinces (C. O. Farquharson), by Mr. W. H. Johnson; Eket District (Mr. and Mrs. P. A. Talbot), by the Trustees of the British Museum; Congo Region, by Dr. E. De Wildeman; Uganda Protectorate, Entebbe, by Mr. W. R. Rutter; Victoria Nyanza, by Mr. T. D. Maitland; British East Africa, by Mr. E. Battiscombe, (Miss M. J. Johnstone) by Mr. W. J. Dowson; Percy Sladen Memorial Expedition (Prof. H. H. W. Pearson and others), by the Percy Sladen Memorial Trustees; Southern Rhodesia, by Mrs. Olive Craster; *Commiphora*, by the Königlicher Botanischer Garten, Dahlem.

*Purchased*: G. Zenker, Cameroons; A. Pappi (per Dr. E. Chiovanda), Eritrea; A. Stoltz, Nyasaland.

MASCARENE ISLANDS.—*Presented*: Madagascar, Central Plateau, by Messrs. H. T. Hodgkin and C. E. Stansfield.

SOUTH AFRICA.—*Presented*: Transvaal (A. O. D. Mogg), by I. B. Pole Evans.

*Purchased*: H. Rudatis, Natal.

NORTH AMERICA.—*Presented*: Arkansas (E. J. Palmer), by Prof. C. S. Sargent; California, by Miss Alice Eastwood; grasses, by the U.S. Department of Agriculture.

*Purchased*: A. H. Brinkman, British Columbia; N. C. Kindberg (per Major Axel Kindberg), mosses; A. A. Heller, Nevada and California; P. B. Kennedy, Nevada.

CENTRAL AMERICA.—*Presented*: Mexican *Coniferae* (G. R. Shaw), by Prof. C. S. Sargent.

WEST INDIES.—*Presented*: Cuba, etc., by the New York Botanical Garden; Dutch West Indies, by the Herbarium van de Rijks-Universiteit te Utrecht; marine *Algae*, by Dr. Marshall A. Howe.

SOUTH AMERICA.—Uruguay, by Mr. Mariano B. Berro.

*Purchased*: E. Ule, Brazil; Dr. Th. Herzog, Bolivia and Chili.

GENERAL.—*Presented*: miscellaneous plants, by the Directeur de la Galerie de Botanique du Muséum Nationale d'Histoire Naturelle, Paris; *Polyporaceae*, by Mr. C. G. Lloyd.

*Purchased*: H. Sudre, Herbarium Hieraciorum, fasc. 2-4; H. Sydow, Fungi Exotici Exsiccati, Fasc. 5-6.

A valuable collection of over 2200 specimens has been received from the Paris Herbarium, and contains many species from New Caledonia, Indo-China and Africa. Mr. C. G. Lloyd has presented *Polyporaceae*, chiefly cotypes of recently described species. The collection of fungi has also been increased by the presentation by the Bentham Trustees of Mr. C. Crossland's British herbarium, containing over 2000 specimens and accompanied by about 500 drawings (*see* Kew Bulletin, 1914, 173), and by the presentation of specimens collected in the Southern Provinces of Nigeria by Mr. C. O. Farquharson. The Herbarium of the Imperial Botanic Garden, Petrograd, has contributed a set of Russian and Manchurian plants. Mr. W. B. Turrill has presented a set of 380 specimens collected during his tour in Ireland last summer.

The Chinese collections have been enriched by the presentation by Messrs. Jas. Veitch and Sons of the specimens collected for them by Messrs. E. H. Wilson and W. Purdom, and by those collected on the Burma-Chinese frontier by Mr. G. Forrest and presented by the Royal Botanic Garden, Edinburgh. Mr. H. C. Robinson's collection from the Malay Peninsula has been worked out at Kew by Mr. H. N. Ridley, who also determined a large number of the Dutch New Guinea plants collected during the Wollaston expedition by Mr. C. Boden Kloss and presented by the Trustees of the British Museum.

Mr. C. E. F. Allen, Curator of the Botanic Gardens, Port Darwin, Northern Territory of Australia, has sent a set of plants collected by him in that district and containing a large proportion of grasses, one of which proved to be undescribed.

Tropical Africa has furnished a large number of collections, including that from Sierra Leone by Mr. N. W. Thomas, Government Anthropologist, who has succeeded in sending very well-preserved specimens by the wet box method. Additional specimens have been received from the Percy Sladen Expeditions in the southern part of Africa. Geheimrat Prof. A. Engler has presented specimens and photographs of his African species of *Commiphora*.

The valuable collection of North American grasses received from the U.S. Department of Agriculture contained many novelties described by Messrs. A. S. Hitchcock and W. R. Maxon, and also filled other gaps in the herbarium. The North American mosses from the herbarium of the late Dr. N. C. Kindberg have been acquired from his son, Major Kindberg, and include many types. The New York Botanical Garden has continued to present, through Dr. N. L. Britton, specimens from various West Indian islands. Dr. Marshall Howe has presented a collection of West Indian Algae, including many calcareous species described by himself and the late Mr. M. Foslé.

---

**Presentations to the Library during 1914.**—The Bentham Trustees have presented a copy of *The Genus Iris*, by W. R. Dykes; a scarce edition of Dioscorides, with additions by Petrus Peduensis, published at Lyons in 1512; Pliny's *Historiae naturalis libri xxxvii.*, Venice, 1507; and the following more or less rare works:—Nigrisoli, *Febris Chinae Chinae expugnata*, ed. 2, Ferrara, 1700; Perla, *De orientali Opobalsamo nuper in Theriacae confectione adhibito* . . . *dissertatio*, Rome, 1641; Pona, *Tratto de' Veleni, e lor cura*, Verona, 1643; Ruiz Lopez, *Della China e delle altre sue specie*, etc., Rome, 1792; Stella, *Il Tabacco, opera* . . . *nella quale si tratta dell' origine, historia, coltura*, etc., Rome, 1669; and Vivenzi, *De Cicuta commentarius*, ed. 3, Naples, 1774. In addition to these about 30 serial or periodical publications received in exchange for *Hooker's Icones Plantarum* have been presented by the Bentham Trustees.

A note in the *Kew Bulletin*, 1914, p. 228, announced that the library now possesses a copy of *The Genus Rosa*, which the author, Miss Ellen Willmott, has generously presented. In this fine work, which contains many beautiful coloured drawings by Mr. Alfred Parsons, R.A., we have a monograph of the rose worthy of the beauty of this universally favourite flower, and of the greatest value and interest to artist, botanist and gardener.

Lady Hooker has continued to send to Kew the *Comptes Rendus* of the Academy of Sciences, Paris, and Miss Alice Eastwood, of the California Academy of Sciences, has sent the weekly issues of *Science*.

The Secretary of State for India has contributed two further volumes of Mr. Foster's work, *The English Factories in India*, dealing with the period 1642–1650; also the following:—*Indian Forest Insects of economic importance: Coleoptera*, by E. P. Stebbing; *List of Trees, Shrubs and Climbers* . . . *found in the Bear Forest Circle*, by D. O. Witt; and the *Botanical Bulletin*



of the Presidency College, Madras, containing *Madras Flowers*, edited by P. F. Eyson.

From Sir Frank Crisp, Bart., the library has received a copy of W. J. Bean's *Trees and Shrubs hardy in the British Isles*, a work in two volumes which will undoubtedly be regarded for many years to come as the standard treatise on hardy ligneous plants; also *Orchidacées de Madagascar*, by R. Schlechter. The latter has been reprinted from the *Annales du Musée Colonial de Marseille*, 3<sup>me</sup> série, vol. i.

The Rev. Canon Ellacombe has presented an excellent copy of Caspar Bauhin's *Theatri Botanici Liber Primus*, Basileae, 1658, differing from that previously at Kew in possessing various indexes at the end of the volume and in being deficient in the portrait of C. Bauhin which is sometimes found on the reverse of the half-title page. A good copy of *The New Flora Britannica*, which is sometimes provided with the title *The New Botanic Garden*, a work in two volumes, consisting of 60 coloured plates of cultivated plants by Sydenham Edwards, with descriptive text, has also been received from him.

A copy of *Die oberschlesische Steinkohlenflora*, Teil 1, by W. Gothan, and about 80 pamphlets on palaeobotany, by various authors, have been received from Mr. Clement Reid.

The fourth part of *Plantae Wilsonianae*, edited by C. S. Sargent; the first volume of the *Catalogue* of the fine library of the Arnold Arboretum; and *The Genus Pinus*, by G. Russell Shaw, have been presented by the Director of the Arnold Arboretum.

The Director of the Department of Agriculture in the Dutch East Indies has sent numerous publications of the department, including the final part of J. J. Smith's *Die Orchideen von Java: Figuren-Atlas*; and from the Director of the Botanic Garden, Utrecht, have been received *Flora voor de Nederlandsch West-Indische Eilanden* and *The Flora of Curaçao, Aruba and Bonaire*, both by I. Boldingh.

As in previous years a number of publications of the Geological Survey of Canada has been sent to Kew by the Director.

The first part of the *Flora Sibiriae et Orientis extremi*, edited by officers of the Botanical Museum of the Imperial Academy of Sciences, Petrograd, has been presented by the Administration of the Museum.

From the Botanical Museum, Upsala, 19 books and pamphlets by R. E. Fries and Th. C. E. Fries, including *Botanische Untersuchungen im nördlichsten Schweden* by the latter, have been received; while Dr. R. E. Fries has personally contributed to the library a copy of his *Botanische Untersuchungen der wissenschaftlichen Ergebnisse der Schwedischen Rhodesia-Kongo-Expedition, 1911-12*, Bd. i. Heft 1.

Among other accessions to the library the following presentations should be mentioned:—*The Annals of the Bolus Herbarium*, from the Trustees of the Bolus Herbarium through the kind offices of Prof. H. H. W. Pearson; the second paper of the first part of *The Botany of Iceland*, from the editors, Dr. L. Kolderup Rosenvinge and Dr. Eug. Warming; *The British Pharmacopœia*, 1914, from the General Medical Council; *The Coco-nut*, by E. B.

Copeland, from the publishers, Messrs. Macmillan and Co.; *The Horticultural Record*, compiled by R. Cory, from Mr. W. J. Bean; *Beknopt overzicht der meest gebruikte Geneesmiddelen in Nederlandsch Oost-Indië*, by J. van Dongen, from the Koloniaal Instituut, Amsterdam; *Elements of the Science of Botany as established by Linnaeus*, ed. 3, 3 volumes, by R. Duppa, from Mrs. Luckhurst; *The Banana*, by W. Fawcett, from the publishers, Messrs. Duckworth and Co.; *Monographische Studien an Treubia insignis*, Goebel, by C. Gruen, from Prof. Hans Schinz; *Handbook of fungus diseases of the Potato in Australia and their treatment*, by D. McAlpine, from the Agent-General for Victoria; *The Forest Flora of New South Wales*, by J. H. Maiden, parts 51-54, from the Secretary of Agriculture, Sydney, while the continuation of the same author's *Critical Revision of the Genus Eucalyptus*, of which 21 parts have now been published, has been received from Mr. Maiden himself; the parts of the *North American Flora* issued during the year have been received from Dr. N. L. Britton; *The Weed Flora of Iowa*, by L. H. Pammel and others, from the Iowa Geological Survey; volume viii. of *The Rothamsted Memoirs*, from the Secretary, Board of Agriculture and Fisheries; *An Account of the Morisonian Herbarium*, etc., by S. H. Vines and G. C. Druce, from the Delegates of the Clarendon Press, Oxford; *Webbia*, vol. iv. pt. 2, from the editor, Prof. Ugolino Martelli; and *A Monograph of the Genus Sabicea*, by H. F. Wernham, from the Trustees of the British Museum.

The following have been presented by their respective authors:—*The Standard Cyclopaedia of Horticulture*, by L. H. Bailey, vol. i-ii; *Atlas de la Flore d'Algérie*, by J. A. Battandier and L. Trabut, fasc. 3-4 (from Prof. L. Trabut); *La Agricultura Colonial*, by M. B. Berro, a work dealing historically with agriculture mainly in Paraguay, Uruguay and Argentina; also *Las Gramineas de Vera*, by the same author; *The Species of Sargassum found along the coasts of the Danish West Indies*, etc., and *The Marine Algae of the Danish West Indies*, part 2, both by F. Börgesen; *A Monograph of the Genus Dryopteris*, part 1, and *Revision of the American Species of Dryopteris*, etc., both by C. Christensen; a volume of papers by Sir Arthur H. Church on *Colein*, *Vegetable Albinism*, and *Aluminium in Plants*, etc.; *Untersuchungen über die Flechtengonidien*, by F. E. Elfving; *Contribuzioni diatomologiche*, by A. Forti; *Δεξικον φυτολογικον* etc., by P. G. Gennadius; *A Flora of California*, by W. L. Jepson, part 4; *List of Trees, Shrubs, and principal Climbers*, etc., recorded from Burma, by J. H. Lace; *The Fungus Flora of Yorkshire*, by G. Massee and C. Crossland, with MS. additions by the latter (from Mr. C. Crossland); *Date growing in the Old World and the New*, by P. B. Popenoe; *Remarques sur les Sphacélariacées*, by C. Sauvageau; *Antarctic Fossil Plants* ('Terra Nova' Expedition, 1910), by A. C. Seward; and *Flowering Plants of the Riviera* as well as *Subalpine Plants*, by H. Stuart Thompson.

Among the manuscripts there is a presentation by Dr. W. Botting Hemsley of a list compiled by himself of the plants contained in No. 15, 'Museum Stove,' Royal Botanic Gardens, Kew, in the autumn of 1862; while a list of stove and greenhouse plants



at Kew, compiled by Alexander Smith in 1848, has been presented by Mr. J. R. Jackson. From Messrs. James Veitch and Sons has been received a memorandum book containing notes on the seeds collected for them in China by Mr. W. Purdom.

Numerous other contributions made to the library during the year, received as presentations from institutions, authors and other sources, which it has not been possible to particularise in this note, will be included in the supplement to the catalogue forming Appendix II. to the *Kew Bulletin*, 1915.

**Botanical Magazine for January.**—The plants figured are *Encephalartos Hildebrandtii*, A. Braun & Bouché (tt. 8592 & 8593); *Cotoneaster pannosa*, Franch. (t. 8594); *Mesembryanthemum thecatum*, N. E. Br. (t. 8585A), and *Mesembryanthemum stylosum*, N. E. Br. (t. 8595B).

The handsome *Encephalartos* was first discovered by Sir John Kirk near Dar-es-Salam on the East African Coast in 1868, and seeds, some of which germinated, were sent by him to Kew in 1870. The plates, giving figures of both male and female cones, were prepared from material obtained from two plants grown on from stems received from Sir John Kirk in 1884. The same Cycad was found later by J. M. Hildebrandt, after whom it was named, on the part of the coast opposite the island of Zanzibar and at other places as far north as Mombasa. The stem is sometimes very short, but may reach a height of 20 feet. The cones are cylindric, the male pedunculate, 8-18 inches long, while the female is sessile and up to 2 feet long. Some interesting points in connection with this plant, including its affinities with the Natal *E. villosus*, Lem., are discussed in an article by Dr. O. Stapf in the *Kew Bulletin*, 1914, p. 386.

*Cotoneaster pannosa* is a native of South-Western Yunnan, where it was originally found by the late Abbé Delavay at altitudes of about 8000 feet above sea-level, and through him was introduced to the Jardin des Plantes, Paris, where some young plants were raised in 1888. The material figured was furnished by a plant received from the Jardin des Plantes in 1894. The species is closely allied to *C. Franchetii*, Bois, and has sometimes been confused with it, but it is distinguished by its smaller leaves with longer petioles, more spreading petals of a purer white, and smaller fruits of a duller deeper red. It is very ornamental in the fruiting stage and succeeds in a naturally poor soil.

The curious and pretty little *Mesembryanthemum thecatum* is a new species discovered by Prof. H. H. W. Pearson in the Van Rhyndorp Division of Cape Colony during the Percy Sladen Expedition to the Orange River in 1910-11. Its leaves are consolidated into obconic bodies about  $\frac{1}{3}$  inch thick, which are bluish-green with dull green markings. The flowers are rose-purple with a yellow eye, and each lasts from four to six days, opening in the morning and closing at night.

*Mesembryanthemum stylosum* is also a new species and is a native of Little Namaqualand, where it was collected during the expedition named in the preceding paragraph. It formed part of

the valuable collection of succulents received at Kew from Prof. Pearson in 1911. In this plant the foliar bodies are deeply bilobed at the apex and the flowers are bright yellow. The latter, as in *M. thecatum*, are odourless, and last for five or six days.

**Greenland Algae.**—Mr. H. N. Dixon has presented to Kew a small collection of marine algae, made by Mr. Edward Whympers and Dr. Robert Brown of Campsler, on the coasts of Greenland in 1867. Robert Brown, who, to distinguish himself from the great botanist added Campsl. to his name, took part, in 1867, in a trip to W. Greenland, and the same year Whympers visited Greenland in order to study Arctic travel and ice phenonema. Brown had charge of the natural history collections for the expedition, and an account of the botanical material appeared in a series of articles by various authors in the transactions of the Edinburgh Botanical Society, the algae being dealt with in vol. ix. p. 456-464 and 465-467. Whympers apparently had a collection of his own, and at his death this, together with his mosses collected during the same expedition, passed into Mr. Dixon's hands through his brother, Mr. Charles Whympers.

A. D. C.

**Sea Island Cotton in the West Indies.\***—The latest publication to hand issued by the Imperial Department of Agriculture for the West Indies is a stout pamphlet dealing very fully and concisely with the above subject. It is described in the preface as a compilation undertaken by Mr. W. Nowell, D.I.C., in consultation with the principal agricultural officers working in association with the Agricultural Department. The facts in the pamphlet are brought, as far as possible, up to date, and it is believed that the work will prove a useful and reliable guide to those concerned in the West Indian Sea Island cotton industry.

The opening chapter gives a general historical review of the industry, followed by others on the botany, cultivation, picking and grading, examination of seed cotton and lint, seed selection, insect pests and diseases, and an appendix of useful additional information.

The chapters on botany and diseases are from the pen of the compiler, whilst that on insect pests is the work of Mr. H. A. Ballou, M.Sc. The original matter embraces fully half of the book and, being freely illustrated, is of particular value.

The general information contained in the work has evidently been selected with great care, and although more pretentious publications are available this latest addition to the literature bearing upon the cotton industry should certainly be consulted not alone by West Indian planters but by those interested in the subject in other cotton-producing countries.

J. M. H.

\* Cotton Cultivation in the West Indies. Imperial Department of Agriculture for the West Indies. Pamphlet series, No. J4, 1914, 118 pp. with numerous illustrations. Price 9d.